February 1990

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The RAINBOW®

THE COLOR COMPUTER MONTHLY MAGAZINE

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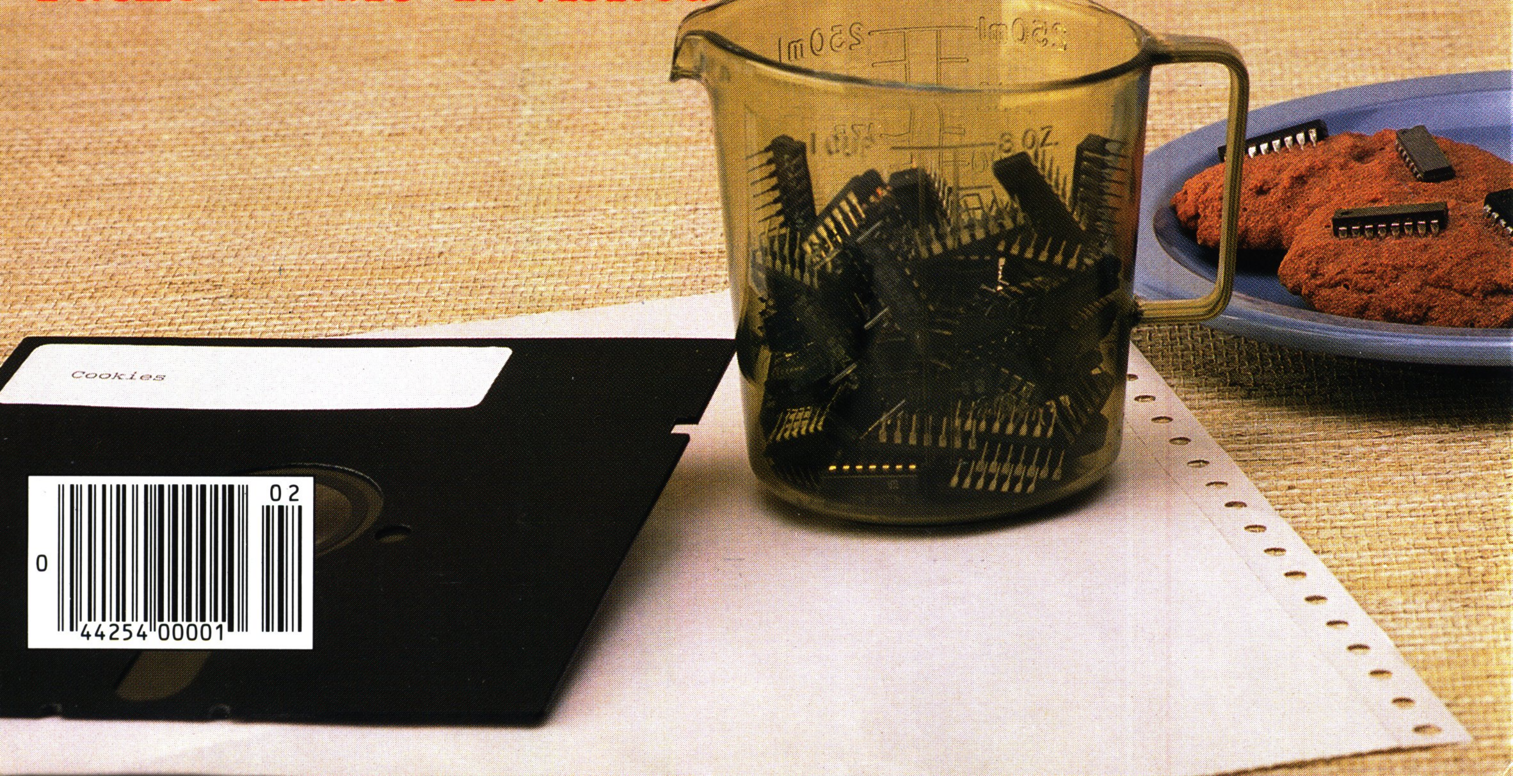

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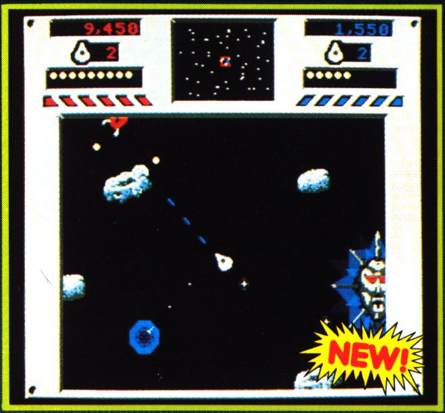
Sinistaar



Sundog Systems proudly presents the first 512K arcade game available for your CoCo III! If you don't have 512K, you will want to get it just for this game! The evil Sinistaars have invaded the galaxy and it falls to you to destroy them. These fiends will attempt to hold you with a constant barrage of drone ships while they muster their strength, and eventually find and obliterate you. Your mission is to mine the myriad asteroids in search of the precious ore which can be refined into sinibombs, your only weapon against the Sinistaars. Many surprises await as you advance through the increasingly difficult stages. Experience the fast-paced action of 512K packed with spectacular graphics, sound effects, and voices! Dozens of stages will keep you coming back for more. Req. 512K CoCo III and disk drive.

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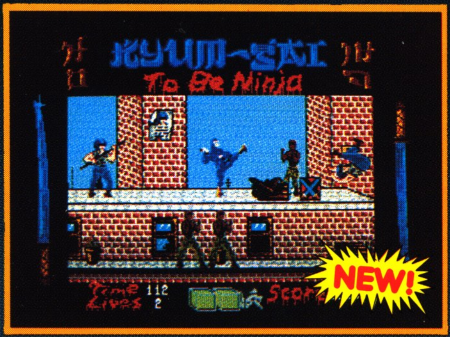

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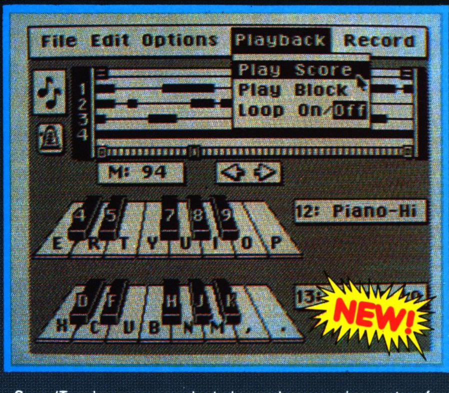

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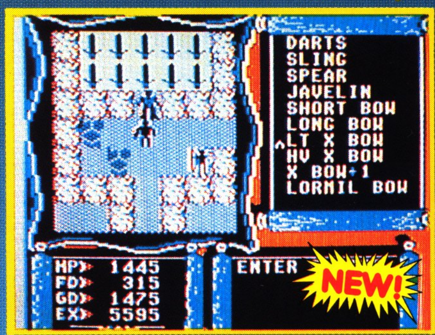

Years after the mysterious hero called the Paladin disappeared, loathsome creatures, spawned from the bowels of the planet, have overrun the land of Tarinth and captured the king. The situation is grave, for without the king's influence, the three nations will not unite against the growing evil. Only one pure of heart can master the five magics and thereby fulfill the Paladin's legacy and save the realm. Adventure into this vast land of fantasy, interract with its inhabitants, explore the ruinous mines, and do battle with supernatural forces. Experience the magic of the quest in this fast-paced role-playing adventure, all in the familiar quick scrolling, bird's eye play format. You will love the feeling of playing an action game with great graphics, animation, and sound effects, but all the while solving one of the most involved adventures yet. Tarinth awaits its savior! Available for all CoCo models! Req. 64K CoCo and disk drive.

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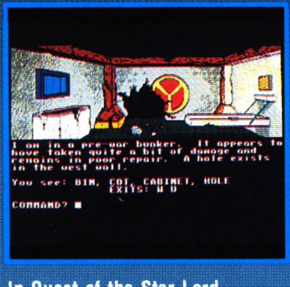

```
I am in a pre-war bunker.  It appears to
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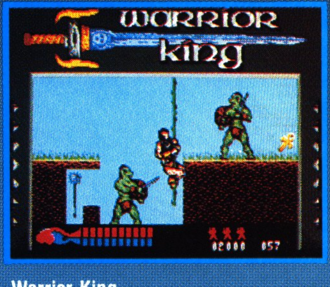

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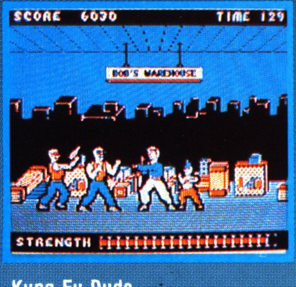

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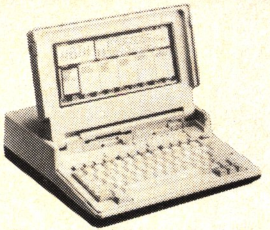

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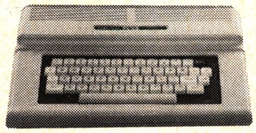

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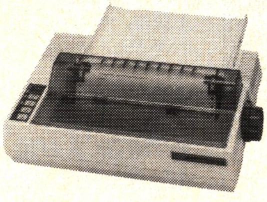

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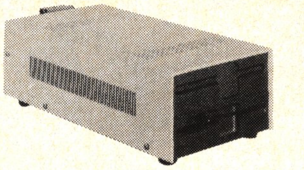

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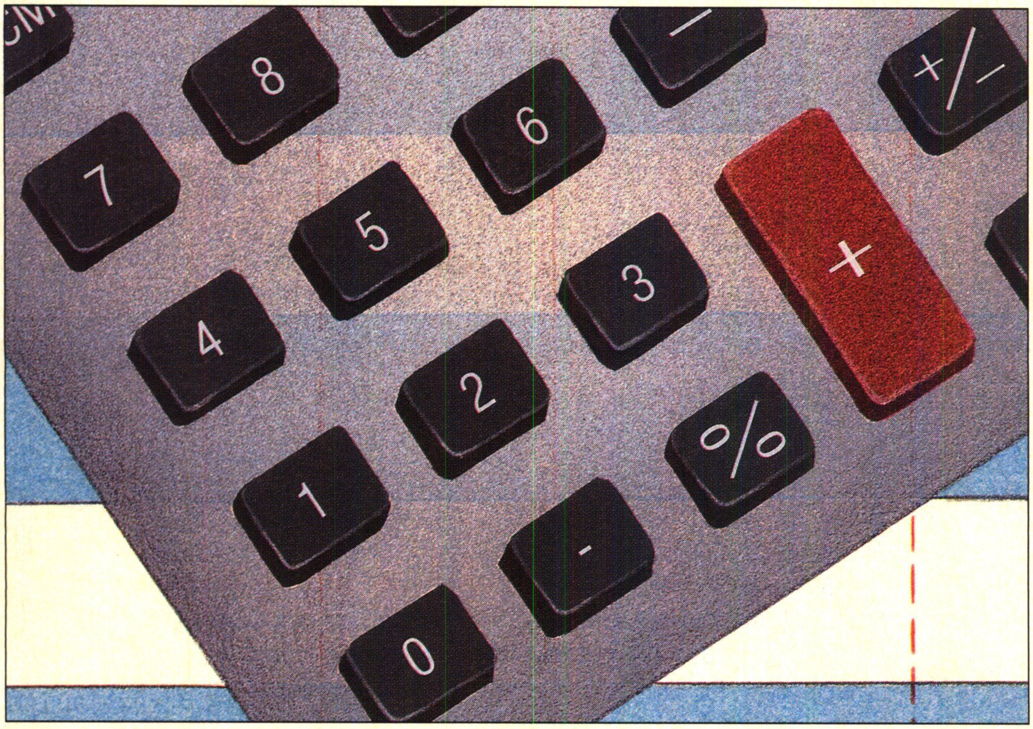

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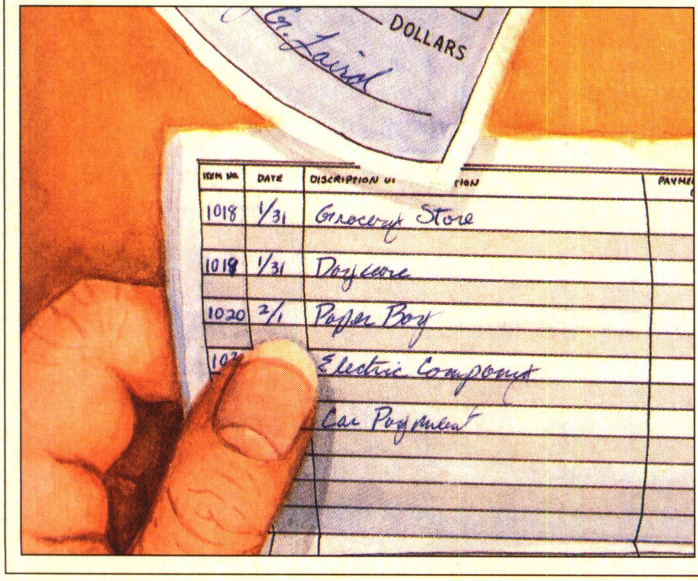
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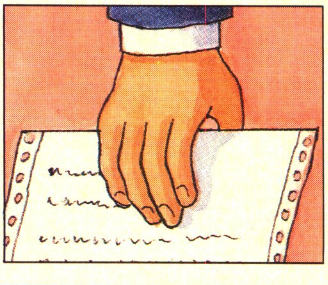

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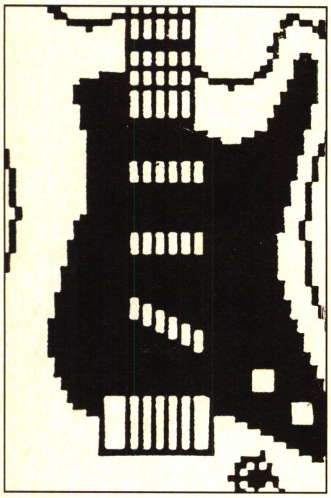

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Letters to the RAINBOW

Buyer Beware

Editor:

On Thursday, October 5, I spoke with Jim Blanden at Arizona Small Computer Peripherals. I told him of the problem I had with my Color Computer 3, and he agreed to fix it. He instructed me to send my computer and a check for $21 to a Scottsdale, Arizona, address he had given me over the phone. Toward the end of the month I started calling the phone number seen in the ad. I must have called at least 20 times, only to be told that no one at the answering service had heard from him. By the middle of November the telephone number had been disconnected.

Toward the end of October and again in November, I sent letters to the new address asking for the whereabouts or return of my computer. As of today I have received no correspondence. I would appreciate any help that you could give me. During this time I have bought new software and hardware from other advertisers in your magazine and would like to be able to use it.

Robert M. Helmick
Winter Haven, Florida

We have recently received a number of complaints regarding Arizona Small Computer Peripherals. Unfortunately, despite repeated attempts, we have been unable to reach Mr. Blanden for comment. Also, Arizona Small Computer Peripherals' advertising in THE RAINBOW has currently been suspended. Until such time as a representative of that company can clear the air, readers may want to take this information into consideration. We apologize for any inconvenience our recent editorial coverage of Arizona Small Computer Peripherals may have caused. Any complaints about this mail-order company should be directed to: The Postmaster General, Tempe, AZ 85282.

Big BASIC Under *ADOS3*

Editor:

A number of your readers have contacted both Art Flexser at Spectro Systems and me, wondering if they can run Danosoft's *Big BASIC* under *ADOS3*. If you use the following procedures, the answer is yes.

Even though it is possible to run *Big BASIC* with standard *ADOS3*, there is still a hard-to-overcome stack conflict between *Big BASIC* and the new Extended *ADOS3* that runs from an EPROM. Therefore, if a user has the new 16K EPROM, these commands should be used:

```
DISABLE:DLOAD
RUN"ADOS3" (the disk version)
```

It is not necessary to run a disk version of *ADOS3* or use `DISABLE` if the EPROM contains only standard *ADOS3*.

Pokes required after loading *Big BASIC* depend on which *ADOS3* version is in use. So first, we must enter this:

```
A=&H7000:POKEA, PEEK(360): POKEA
+1, PEEK(361): POKEA+2, PEEK(&HA
D1A): POKEA+3, PEEK(&HAD1B)
```

Now enter this:

```
LOADM "BB 512/1-0" (or "BB 128/1-0")
```

Since *ADOS* copies a version of RS-DOS 1.0 into memory, only the 1.0 version of *Big BASIC* found on the production disk can be used.

After you load *Big BASIC*, make the following pokes together from one line to avoid a crash:

```
A=&H7000:POKE360,PEEK(A):POKE 36
1,PEEK(A+1)
```

The two systems will be compatible after these pokes:

```
B=&HA4EB: POKE B,189: POKEB+1, P
EEK(A+2): POKEB+2, PEEK(A+3): PO
KEB+3,18
```

To make it easier, the above code can be run in a short program that also uses *Big BASIC*'s autorun feature. *Big BASIC* now comes with just such a program tossed in.

Bill Daniels
Danosoft
Mississauga, Ontario

Supporting the CoCo

Editor:

Many of us in the CoCo Community are outraged at the lack of support for the Color Computer. True, some companies support the CoCo, but many of them are sticking with Disk BASIC programs rather than going with OS-9. Therefore, many of us refuse to buy a program from a company unless it offers an OS-9 version. For the CoCo to survive, we need to see more OS-9 programs. Those writing programs in Disk BASIC should write them in OS-9 and try selling them to Tandy or a third-party vendor.

As for major third-party companies, they do not seem to be porting their programs over to the CoCo anymore. While we have not heard anything from Epyx about this, we have heard from Sierra. It has decided to stop making CoCo conversions because of the lack of speed and sound. I did not buy *King's Quest III* and *Leisure Suit Larry* for the sound, but for the graphics quality and the game itself.

Many persons are writing letters such as this one to companies like Tandy and Sierra. Some of us are even meeting on a national level to discuss the CoCo's future (there has been a lot of talk about a CoCo 4 and an OS-9 Level II update). While the same discussions are occurring on Delphi and CompuServe, those services cost money. This board offers toll-free access for messages and a toll line to allow access to file transfers as well. This board is supported by Hayes and offers a CoCo SIG. Online With Hayes can be reached at 1-800-US-HAYES, and the number can be reached from all over Canada and the United States.

We hope all the CoCo users with modems will give it a call and take a look around. We are also forming a users group on this board — the ICCO (International Color Computer Organization). Two of our major objectives are to eliminate piracy in the CoCo community (a real tough undertaking, but we are going to try) and to convince companies like Sierra and Tandy to bring out more programs for us.

Ken Flanagan
Prince George, British Columbia

BASIC09 on CoCo 3

Editor:

I have been playing with BASIC09 on my OS-9 Level II CoCo 3. There are two things I can't seem to work out: how to take a picture I have drawn on the screen (and can access with Get/Put buffers) and save it to disk, and how to save some of my icons for use in my BASIC09 applications.

Also, how can I direct ouput from one process to another? I want a program running in the foreground to send data to a

CIII Pages

by Walter Bayer

The *ultimate* **desktop publishing** program for the CoCo 3. Pull-down menus, icons & dialog boxes, drawing tools (create boxes, polygons, rays, circles, elipses, brush shapes), cut, copy, stamp, paste, zoom, flip, enlarge/reduce, rotate, stretch, undo, import any ASCII text, 2/3 columns & page preview. Includes 14 fonts & 60 pieces of clip art. Req. CoCo 3, RGB/ Monochrome Monitor, Min 1 drive, Tandy Hi-Res Interface, Joystick/mouse & DMP 105/106/Epson/Gemini & Compatible Printer. Only **$49.95**. w / Hires Inteface Only **$59.95.**

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background program. The only way I have been able to do this kind of thing is to establish a common data structure (say, in RAM disk) that both programs can access. Is this the only way to do this?

Tom Hickey
Kingston, New York

Back on Track

Editor:

Congratulations! I just finished leafing through the latest issue of THE RAINBOW (December '89), and felt I had to write. I've been reading your magazine since January 1983, and I haven't missed an issue — but this issue caught my attention.

For a while, I've been wondering where the magazine is heading — I've had less interest in the articles but keep buying it for the sake of keeping my collection going. Sure, there were a few things that helped me, and I know that creating a magazine for everyone is a tough job, but I was beginning to worry that it was becoming too slick, too watered-down. This last issue changed all that! I'm thrilled to see the magazine returning to a more technical format. The articles on MIDI, OS-9 and *Multi-Vue* were perfect.

While beginners are important, it's good to see something for the old-timers looking for new tricks as well. In some respect we're all beginners, and it's nice to see you're still helping us grow along the way.

Mike E. Fahy
Havelock, North Carolina

Good Consumer Relationships

Editor:

I am retired and have time to fully enjoy my CoCo 3. Your publication, in no small way, has been responsible for the success of my system. Beyond that I find the suppliers of hardware and software more dedicated and supportive than any I have found in comparative consumer relationships.

I have to give credit to Tandy for making the basics available and continuing to support them with improvements over the years. However, it is the aftermarket developers and surveyors of hardware and software (your advertisers) that really make the CoCo sing.

Two such companies are RGB Computer Systems and Microcom Software. Both have helped me immeasurably with after-purchase support, including hints and advice to make the system operate beyond my level and expectations.

Blaine G. Tempest
Lyons, Colorado

Digitizing With the CoCo 2

Editor:

I would like to get into video digitizing. However, in all of the ads I have seen, only the Color Computer 3 is mentioned. Is there a video digitizer for the Color Computer 2? If so, please send me all of the information needed to digitize. These are the components I already have: a Color Computer 2, Multi-Pak Interface, disk drive, and black-and-white video camera.

Christopher Zaborsky
Milwaukee

See the Howard Medical advertisement for information on the DS-69B Digisector.

Baud Rates and the Multi-Pak

Editor:

My CoCo and Tandy printer won't work with programs that have the high baud rates included, so I usually look up the codes and change the baud rate to 600. How can I use the higher rates?

What happened to the Multi-Pak, or has something else taken its place?

I have enclosed a `REM` statement at the beginning of each program I type in. I can list the first few lines and find out which issue and page number of THE RAINBOW to go to for reference.

Don Helle
Monticello, Florida

Most Tandy printers can be set to 2400 baud via internal DIP switches. To go higher than this, you need to use a serial-to-parallel converter and hook into the printer's parallel port. The Multi-Pak has been discontinued by Tandy, but Orion's ad indicates they are offering a work-alike.

Keeping Up With School

Editor:

I own a Color Computer 2 with a disk drive, mouse and printer. I'm a ninth-grader and have been having trouble in Spanish class. I wonder if anyone knows of a Spanish disk or cartridge for my computer.

I also wonder if there is a program I can use to record all of my test grades in school, and at the end of each quarter have the grades averaged on my printer and saved to disk.

Todd Reaves
420 Dixwell Ave., #16
New Haven, CT 06511

We leave it to other readers to help you with your first question. As for the second, look at the spreadsheet program in this issue (Page 26) to do some serious grade averaging.

Sequencers and Samplers

Editor:

I was very pleased to see Jeffrey S. Parker's article on MIDI (December '89). However, Mr. Parker seems confused as to the difference between a sequencer and a sampler.

A sequencer is a device that tells a synthesizer what notes to play and in what order to play them. *Lyra*, *UltiMusE III* and *CoCo MIDI 3* are programs that allow a CoCo to function as a sequencer. A sequencer does not record sounds; it records digital data. A sequencer functions much like a word processor (which really doesn't process words but records the order that you pressed letter and space keys).

A sampler, on the other hand, does record and play back sounds by converting the analog sounds into digital data and then back again. With a sampler you can record your voice, a dog barking, or any other sound. A sequencer cannot do this. *Studio Works* is a program that lets a CoCo function as a sampler.

I hope that this will clarify things.

John E. Mueller
Colton, Oregon

Here's the Way I See It

Editor:

I have a few words to say about your program listings. Just when I solve a problem I've had with getting them into a computer, you blow me out of the water. My eyes are 63 years old and I have enough trouble typing from nice clear copy on a white background.

OK, so most of your readers have eyes like eagles because they are only 12 years old. They can handle the smaller type and the colored backgrounds, but why inflict them on us far-sighted old relics?

Billy R. Pogue
Lake Havasu City, Arizona

We understand your aggravation and we are always open to change. Still, the fundamental trade-off between listing size and the amount of information we can provide exists. How 'bout it, folks?

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

> ...Just think of any word processing feature, chances are Word Power has it...packs a lot of features...excellent word processor..." **Word Proc. Comparison**-April 1989 Rainbow; Pg 26.

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Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear on the printer. You can view margins, page breaks, justification and more.

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The Show Must Go On

While working at the most recent RAINBOWfest in Somerset, New Jersey, I began to consider why people are willing to travel such distances to attend it. Obviously, the many bargains are a big attraction, and seeing what's new adds to the excitement. Then I asked myself: Why do *I* attend (aside from my work with THE RAINBOW)?

In an otherwise fast-paced and disposable society, it is comforting to know there are others out there like me — people who share my longheld interest in computers. I read and edit articles by many users in the CoCo Community, and it is nice to meet them in person. I can express my concerns and frustrations to them as well as discuss new ideas.

What impresses me most about RAINBOWfests is the carnival-like atmosphere. A RAINBOWfest is certainly not as mobile as a carnival, but it stimulates the same warm feeling among its attendees. There is camaraderie in the CoCo Community, just as with the members of a carnival who must work together to make the show go on. Friendships are established and members solve the problems we all face — they make the most of what they have.

In support of this spirit, THE RAINBOW has introduced a new department called "The Intercom" — a meeting place of sorts for Color Computer users worldwide. On a bimonthly basis, "The Intercom" provides you with pen pals and club and BBS listings — keys to communication, the cornerstone of any thriving community.

Still, certain concerns require more than a software rewrite or soldering-iron hack. They require a change in our point of view. Unlike the carnival where people work to get the most from what they have, the CoCo Community has fallen prey to negative talk.

It appears many of us are starting to believe our friends (who happen to own other computers) when they say, "The CoCo is a game machine." Of course, the fact that Tandy recently added several games to its line of products for the CoCo seems to back this up. Personally, I don't care how Tandy markets the Color Computer. It exists, and THE RAINBOW and the CoCo Community will support it as always — that is, unless we choose to continue a negative cycle.

I see two forms of griping: constructive criticism, which the visionary sees as an indicator that the market continues to be ripe; and pointless grumbling that breeds negative feelings in users.

It is up to us in the CoCo Community to take advantage of what we have and create what we don't have. Or we can whine about what others don't give us. We at THE RAINBOW choose to be a part of the solution, not the problem. And we think you'll see this sentiment reflected in our pages.

Let's get down to business now, before our carnival becomes a circus.

* * * * *

Because of an editorial oversight, Lonnie's column in the January 1990 issue (Page 10) incorrectly implies a discount of $13.50 on the softcover version of the upcoming book, *CoCo: An Affectionate History of the Tandy Color Computer*. The advance-basis discounted price of the book is $13.50. We apologize for any inconvenience this error may have caused.

— Cray Augsburg

Because of conflicts between editorial deadlines and COMDEX dates, Lonnie's column does not appear this month. "PRINT#-2" will return in March.

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Reducing fractions to their lowest form

From Fractures to Fractions

by Dr. Bruce Wulfsberg

After a day's work dealing with everything from checking for scoliosis to setting bone fractures, I enjoy sitting down with my CoCo and unwinding. Often my mind just keeps right on working, though, and during one of those times I came up with an idea for a program to help calculate fractions. It's great for checking your kids' math homework.

Fraction Math reduces fractions to their lowest forms and adds, subtracts, multiplies or divides any two fractions, then prints the result as a fraction and in decimal form. It should work on any CoCo and can be used on 32-, 40- or 80-column screens.

Upon running the program, you are asked for a numerator and denominator. The program then reduces the fraction to its lowest form. At the prompt you can end, ask for another, or chose an operator (+, -, *, /). If you select an operator, you are asked to enter a second fraction, which is also reduced to its lowest form. Again the answer is printed in fraction and decimal form. You can enter mixed fractions in their improper form (1½ as 3/2); decimals and negative numbers can also be used.

Because it may take some time for numbers with large denominators, the speed-up poke can be used — the heart of the program is a `DEF FN` statement located in Line 100 and used in Line 330 to reduce the fractions to their lowest forms. The math routines are located in lines 180 through 220. Some interesting print and selection routines are used as well as corrections so negative fractions are printed properly. ❑

Bruce Wulfsberg is an orthopedic surgeon practicing in New Jersey. His interests include computers, magic and kite flying.

32K Extended

172	86
310	145
354	232
END	231

The Listing: FRACTION

```
0 'COPYRIGHT 1989, FALSOFT INC.
100 CLS:CLEAR5000:PR$="LCDNEW/BA
S:0":DEF FNMD(M)=N-(M*INT(N/M)):
SP$="                 ":
110 PRINT:PRINT"  FRACTION MATH
AND LEAST COMMON":PRINT"  DENOMI
NATOR BY ELLIS/WULFSBERG":PRINT
120 GOSUB310:A=AX:B=BX:
130 PRINT:PRINT"  CHOOSE +-*/ (A
)NOTHER (E)ND"
140 Y$=INKEY$:IFY$=""THEN140
150 Z=INSTR("+-*/AE",Y$):ONZ GOT
O170,170,170,170,100,290
160 GOTO140
170 PRINT"NOW ENTER THE SECOND F
RACTION  ";MID$("+-*/",Z,1):PRIN
T:GOSUB310:C=AY:D=BY
172 PRINTA;"/";B;MID$("+-*/",Z,1
);C;"/";D;
180 'MATH ROUTINES
190 IF Z=1 THEN A=(A*D)+(C*B):B=
(B*D):
200 IF Z=2 THEN A=(A*D)-(C*B):B=
(B*D)
210 IF Z=3 THEN A=(A*C):B=(B*D)
220 IF Z=4 THEN A=(A*D):B=(B*C)
230 PRINT:PRINT"THE ANSWER IS:":
AX=A:BX=B:GOSUB320
250 PRINT"WOULD YOU LIKE"
260 PRINT"(A)NOTHER, OR (E)ND"
270 Y$=INKEY$:IF Y$="" THEN 270
280 IFY$="A" THEN 100
290 CLS:PRINT"GOODBYE":END
300 'SUBROUTINES FOR LCD
310 J=1:INPUT"NUMERATOR  ";AX:AY
=AX:PRINT"               ----":INPU
T"DENOMINATOR";BX:BY=BX:IFBX=0TH
ENPRINT"/0 NOT ALLOWED":GOTO310:
320 IFBX<0 THENBX=-BX:AX=-AX
330 IFBX=1THEN350ELSEFORJ=BX TO2
 STEP-1:N=AX:IF(FNMD(J)=0)THENN=
BX: IFFNMD(J)=0THEN350
340 NEXT:J=1:
350 IFAX=0 THENPRINT,0 ELSEAX=AX
/J:BX=BX/J:BX$=STR$(BX):PRINT,ST
R$(AX);"/";RIGHT$(BX$,LEN(BX$)-1
):
351 PRINT,AX/BX:
352 CX=AX/BX:SI=SGN(CX):SI$=MID$
("- +",SI+2,1):AB=ABS(CX):AI=INT
(CX):IFAI=0THENPRINTSP$;SI$;:
354 IFAI>=1 THENPRINTSP$;" ";AI;
"and";
356 IFAI<=-1THENAI=AI+1:PRINTSP$
;" ";SI$;
357 IFAI<=-1THENPRINTCHR$(8);AI;
"and";
358 N=ABS(AX):AX=FNMD(BX):B$=STR
$(BX):PRINTSTR$(AX);"/";RIGHT$(B
$,LEN(B$)-1)
359 ''PRINTAY;BY;AX;BX;:STOP
360 AX=AY:BX=BY:RETURN
```

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Remember this proverb:
Knowledge comes on the wings of the manual!

The Price of Wisdom

By Stephen Murphy

Over the past eight years I have managed to accumulate three printers because I was simply trapped by the lure of new technology and subtle marketing techniques that keep the computer business on its feet. My pride and joy is my Tandy DMP-2100, which I use at home for fast word processing and processing account reports for my church. It's aging, but it's lightning-fast and gives a good quality print. At least it did until last summer when it died in agony.

I had been asked to run off mailing labels for the church congregation (some 250 people). I had loaded up Old Reliable with the labels when I heard a bone-jarring crunch. The DMP 2100 jumped to life, shook, and made a horrible grinding noise that made my hair stand on end and sent my two cats scurrying from the room. Instinctively my left foot reached for the clutch. The *clutch*? Yes, the grinding sounded like

Steve Murphy is a senior logistician for Information Network Systems Inc., an Arlington, Virginia professional services firm. He is also a Lieutenant Commander in the Naval Reserve and holds a B.A. from Harvard University in Chinese. He may be contacted at 7138 Tolliver Street, Alexandria, VA 22306; (703) 982-2102.

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my first encounter with Mom's Buick back in high school.

There was a pitiful peeping as the red lights came on, first on the printer, then on the buffer. The poor computer, deceived into believing the buffer was the printer, kept on printing merrily away.

After ritually chanting several choice pagan exclamations that were completely inconsistent with church business yet nonetheless appropriate, I began to consider my options. The only reasonable one was to lug the machine to work in the trunk of my car, drop it off at the Radio Shack Computer Center, wait a few days, then pick it up again. After all, I had been using it for four years without any mishap. "That's life," I told myself.

My engineering co-workers consoled me at the office, and we discussed various facets of reliability and maintainability that seemed to apply. My associates concluded I was fortunate to experience such a long interval without any down-time. We then discussed the advantages of taking our equipment into a "depot" for repair, versus "field maintenance" repair, which required stock repair parts, associated technical skills, test equipment, facilities, etc.

All of this was little comfort to me during the next week as I waited for the printer to be repaired. During the interim I used my old, venerable LP-IV printer to get the labels out. I hooked it up and loaded the labels with difficulty in its awkward and outmoded tractor-feed mechanism. The ancient, faded ribbon took nearly an hour to produce a set of barely legible mailing labels, but the job was done.

Finally it was time to pick up the DMP-2100. The repair center was unable to find anything wrong, but the man cleaned and tuned the printer for a hefty $50. So I lugged it home, reconnected it and packed up the LP-IV.

The story might have ended here had I not done so much word processing in the next few weeks. I was involved in writing an article for PCM and trying to beat my self-imposed deadline of submitting it by the end of the month. But when I tried to get a final, smooth copy . . . you guessed it!

Once again I took the massive contraption in for repair — on the last day of the effective warranty. It was returned a few days later, and although the warranty covered the service, I had to pay for the new part that had not been a problem the first time.

Was it time to consider a new printer, or should I somehow make do with the LP-IV and the DMP-130? My colleagues and I discussed this with no consensus. I continued to use the "repaired" DMP-2100, but each printout was a source of anxiety. I minimized my printing needs by producing a hard copy only when absolutely necessary. I walked on eggshells, waiting for the inevitable and cursing Radio Shack's products, technicians, and their ancestors.

After ritually chanting several choice pagan exclamations that were completely inconsistent with church business yet nonetheless appropriate, I began to consider my options. The only reasonable one was to lug the machine to work in the trunk of my car and drop it off at the Radio Shack Computer Center.

Finally one day it happened — the same awful crunch, the same experience of my hair standing up on my nape. I uttered a few *different* but no less (or more) effective epithets learned in the Navy. I turned off the computer system, sat back, and wondered what I was going to do. One option I quickly ruled out was lugging the thing back for repair again.

A few days later after experiencing the symptoms of computer withdrawal — denial, anger, remorse, grief and finally acceptance, I went into the bathroom to trim my moustache. The little electric trimmer went to work, then suddenly made a familiar crunching noise, albeit on a smaller scale. This time, however, I hardly noticed the hairs on my neck standing up because the trimmer was pulling the hairs out of my moustache without even having the decency to stop altogether as the printer had. I excoriated the gadget in familiar nautical terminology while rubbing my sore upper lip. Reaching into the drawer, I grabbed the little vial of oil that came with the clipper, put a drop neatly on the blade head, and was off to the races once again.

It actually took several minutes for the synapses of my dinosaur brain to make the connection between my electric trimmer and the accursed computer. Enlightened at last, I went in and lifted the cover of the DMP-2100.

I had not really noticed before what an intricate machine this printer is. Unlike my LP-IV, the DMP-2100 print head travels on two metal guide rails for increased speed, control and accurate head positioning. Marveling at the obvious, I tried something new — or actually something very, very old. I pulled out the printer manual, which I confess I rarely use except to look up printer control codes and other essential information. But this time I looked at the appendix titled, *Care and Maintenance*, where I read: "After cleaning with a soft cloth, lightly oil the two carriage guides with a high-grade lubrication oil or with high-grade sewing machine oil. (This should be done every six months.)"

Now I really did consider taking the printer back to the computer center, since this helped cover the painful truth. But I bravely plodded out to the bathroom, got the vial of oil and returned to the computer room. I placed a few drops on the guide rails and wiped them with a clean handkerchief. Muttering a prayer to the patron saint of dot matrices, I powered up the printer and pressed the self-test button. Lo and behold the printer sprang to life, gracefully printing out the test pattern. I felt like Moses after parting the Red Sea. It was truly beautiful.

I returned to work the following day, a humbled but wiser man. I paid a price for my wisdom — some 50 bucks, a few moustache hairs and great inconvenience, but I rediscovered one of the fundamental maintenance strategies of modern technology and weaponry: Read the instructions!

Now keep this secret from the enemy. ❑

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Turn of the Screw

A Digital Lesson

by Tony DiStefano
Contributing Editor

While the experts are still slaving over their RAM disks, I am turning my attention to the beginners once more. This month I start with the basic concepts of digital electronics — discussing the definitions for bit, digital, analog and logic gates.

The dictionary defines analog as proportionate. An *analog signal* is one in which the level changes smoothly. A *digital signal*, on the other hand, is made up of specific, discrete levels. With this in mind it is easy to see how a dimmer-controlled light represents an analog system, while a three-way light demonstrates principles of a digital system.

For our discussion we are interested in the binary digital system. This system involves only two steps or states: on and off. There is no in between or shading. This is the core of computing. Everything you see your computer doing is using one of these two states.

The first state, on, is also known as *high* (or HI), *plus*, *one* (or 1), *mark* and *voltage*. The two terms I use throughout this article are HI and 1. In most computers the operating voltage for the hardware is 5 volts. Given this, a high would be about 5 volts, but 4.5 volts is also considered high. There are limits to how low the voltage can be before it is considered off. (This will be covered in another article.)

The second state, off, is called *low* (or LO), *minus*, *zero* (or 0), *space* and *ground*. To be consistent, I use LO and 0 to mean off throughout this article. A low state is considered to have 0 volts, although under certain conditions a small voltage level is present.

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

The Numbers Game

Now we know about the highs and lows of digital operation. The next item for discussion is a *bit* (binary digit), which is one piece of digital information and will be in one of two states — low or high.

A bit can be also considered as one digital bit. If you had two bits, you could show four separate combinations:

State 0 = 00
State 1 = 01
State 2 = 10
State 3 = 11

If you had three bits, you would have eight different combinations:

State 0 = 000
State 1 = 001
State 2 = 010
State 3 = 011
State 4 = 100
State 5 = 101
State 6 = 110
State 7 = 111

Can you see the pattern as it develops? Every time you add one more bit, you double the amount of different combinations possible. This is Base 2 or the binary numbering system. Most of us are more familiar with Base 10 or the decimal numbering system. In short, Base 10 numbers, unlike Base 2 numbers, have 10 different states per digit:

State 0 = 0
State 1 = 1
State 2 = 2
State 3 = 3
State 4 = 4
State 5 = 5
State 6 = 6
State 7 = 7
State 8 = 8
State 9 = 9

I'm sure you recognize these numbers; we use them every day. Once you reach the top of the number ladder, you add another digit — a carry over. Each number added raises the value of the digit in that number by a factor of 10.

$$\begin{aligned}3215 &= 3000 + 200 + 10 + 5\\ &= 3 \times 10^3 + 2 \times 10^2 + 1 \times 10^1 + 5 \times 10^0\end{aligned}$$

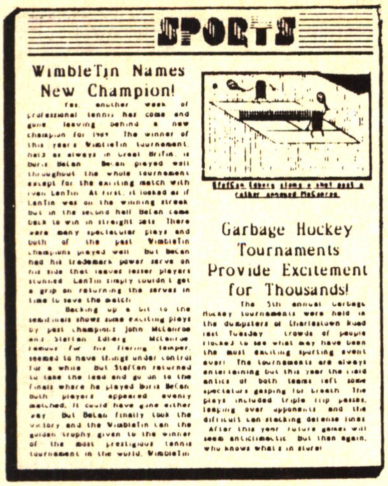
When big numbers are to be represented, there are more digits. Each new digit added means adding another power of 10. Numbers ranging in the millions require only seven digits in Base 10 numbers, but require many digits in Base 2 since every added digit is only to the power of 2:

$$\begin{aligned}22 &= 16 + 0 + 4 + 2 + 0\\ &= 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 0 \times 2^0\end{aligned}$$

You can see that a Base 2 number adds up to a lot less than Base 10. There is yet a better numbering system, but first let's look at a bit more.

The CoCo has an 8-bit CPU. This means all data, programs and characters are stored in 8-bit groups, better known as bytes. A byte can hold any value from 00000000 to 11111111, or in decimal from 0 to 255. If you convert 1111111 to decimal, it works out to 255. Each byte in the CoCo is one memory location and can hold one ASCII character or one machine language code (more on memory later).

In the computer environment one numbering system is used more than any other. It is called the hexadecimal numbering system, or Hex for short. The Hex system, as the name implies, is a Base 16 system. That means there must be 16 symbols before the carry over to the next digit. In Hex the symbols are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E and F. Just as the next digit after 3 is 4 (3+1), the next digit after 9 (9+1) is A.



SPORTS

WimbleTin Names New Champion!

Yes, another week of professional tennis has come and gone leaving behind a new champion for [illegible]. The winner of this year's Wimbletin tournament, held as always in Great Britin, is Boris Belen. Belen played well throughout the whole tournament except for the exciting match with Ivan Lentin. At first, it looked as if Lentin was on the winning streak but in the second half Belen came back to win in straight sets. There were many spectacular plays and both of the past WimbleTin champions played well. But Belen had his trademark power serve on his side that leaves lesser players stunned. Lentin simply couldn't get a grip on returning the serves in time to save the match.

Backing up a bit to the semifinals shows some exciting plays by past champions John McEnroe and Steffan Edberg. McEnroe, famous for his flaring temper, seemed to have things under control for a while. But Steffan returned to take the lead and go on to the finals where he played Boris Belen. Both players appeared evenly matched. It could have gone either way. But Belen finally took the victory and the Wimbletin (won) the golden trophy given to the winner of the most prestigious tennis tournament in the world, Wimbletin.

Steffan Edberg slams a shot past a rather annoyed McEnroe

Garbage Hockey Tournaments Provide Excitement for Thousands!

The 5th annual Garbage Hockey tournaments were held in the dumpsters of Charlestown Road last Tuesday. Crowds of people flocked to see what may have been the most exciting sporting event ever! The tournaments are always entertaining but this year the field antics of both teams left some spectators gasping for breath. The plays included triple flip passes, leaping over opponents and the difficult can stacking defense lines. After this year future games will seem anticlimactic. But then again, who knows what's in store!

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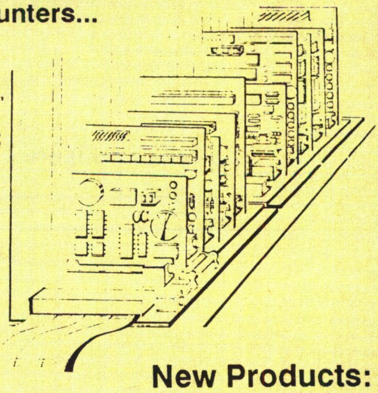

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Remember that A, B, C, D, E and F are digits, not letters, in the hexadecimal system. The following table shows the different numbering systems described in this month's main topic.

Decimal	Hex	Binary
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
10	A	1010
11	B	1011
12	C	1100
13	D	1101
14	E	1110
15	F	1111

As you can see from the above table, the Hex numbering system is the most efficient. This is because of its higher base number. The decimal system takes two characters to the one character needed by Hex. Binary takes four characters. Since the CoCo has an 8-bit data bus, you can represent a data value with eight bits (11111111), or three decimal digits (255), or a two-digit Hex number ($FF). From this point on I use all three numbering systems. When using Hex, I begin with the $ character, although some like to put the letter H at the end of the number.

Understanding Hex and binary numbering systems and what they stand for in a computer is the basis from which your knowledge of the CoCo grows. I have not covered adding and subtracting or conversion from one base to another in this article, but if you want to learn more on numbering systems, go to your local library and look up numbering systems in the math section.

Bits and Chips

So far there doesn't seem to be any relation between this and computers. All we've done is express numbers in a different form. But we are a little closer to computers than you think. We know that the computer is made up of a lot of chips that use bits of 0's and 1's. In order to help you understand these chips, I will go into detail on how they use 0's and 1's.

The heart of all digital computers is the logic circuit element. It performs binary arithmetic operations, makes logical decisions, and performs operations such as counting and temporary storage. The basic type of logic element is called a *gate*. Gates are circuits that look at two or more binary inputs and produce a binary output that depends upon the conditions of those inputs. In order to understand this better, look at Figure 1a, an equivalent circuit.

This circuit contains three components: a battery, a switch and a bulb. The switch is considered an input. When the switch is on, representing a logical 1 state, the bulb (the output) is lit. When the switch is off, representing a 0 state, the bulb is off. In logical terms we say that the input is the switch and the output is the bulb. The symbol used to represent this type of logic circuit is shown in Figure 1b. This gate is called a *buffer*. The input is exactly the same as the output. It's not very useful in the logical sense, but needed under certain circumstances.

The next diagram, Figure 2a, is a little different. It has two switches. The two switches are in series, that is to say, one after the other. Therefore they must both be on before the bulb will turn on. This circuit or logical element is known as an AND gate. An AND gate is a logical element with two or more inputs and a single output. Both (or all) inputs must be Binary 1 to produce an output of Binary 1.

The symbol for an AND gate is shown in Figure 2b. The main value of the AND gate is its ability to detect when all inputs are Binary 1. A quick way to remember this

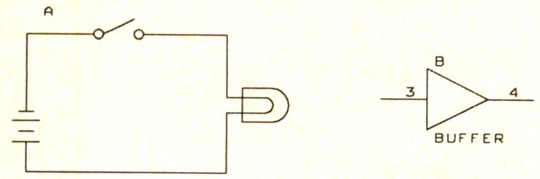

Figure 1

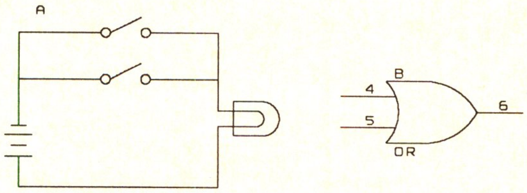

Figure 3

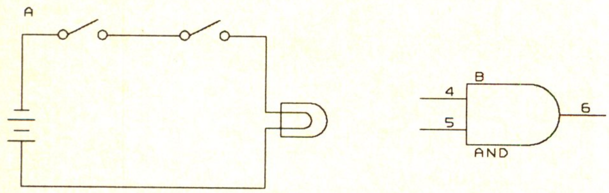

Figure 2

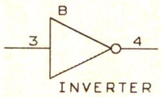

Figure 4

gate is: when A and B are 1, then Y is 1 — hence the term `AND`.

The next gate we will study is the `OR` gate. Again we have two switches in Figure 3a. The difference is that now they are wired in parallel — that is, one on top of the other. If either switch is on, the bulb will be on. If both are on, the light is still on. This circuit or gate is known as an `OR` gate. The `OR` gate is a logical element with two or more inputs and a single output. If any one input is a Binary 1, the output is Binary 1.

The symbol for an `OR` gate is shown in Figure 3b. The main value of this gate is its ability to detect when all inputs are Binary 0. A quick way to remember this gate is, when A or B is 1, then Y is 1 — hence, the term `OR`.

Looking back to our first gate, the buffer, notice the input matches the output. It is commonly called a *noninverting* output. This gate and most other gates can also come in an inverting output form. In the case of our buffer, it becomes an inverter, better known as a `NOT` gate. Figure 4 shows the symbol of an inverter, which is defined as a logic element with an output that is always the complement (the opposite) of its input.

Notice the difference between a buffer symbol and an inverter symbol: The inverter has a small circle on the output side; any inverting output gate will have a small circle on the output. This is true for the `AND` and the `OR` gate too. If you took the output of an `AND` gate and tied it to the input of a `NOT` gate, the result (the output of the `NOT` gate) would be an inverted `AND` gate. (see Figure 5). This requires two gates and some wiring. It is so often used that the IC designers decided to put it all in one chip called a `NAND` gate. The principle applies for an `OR` gate; it becomes a `NOR` gate.

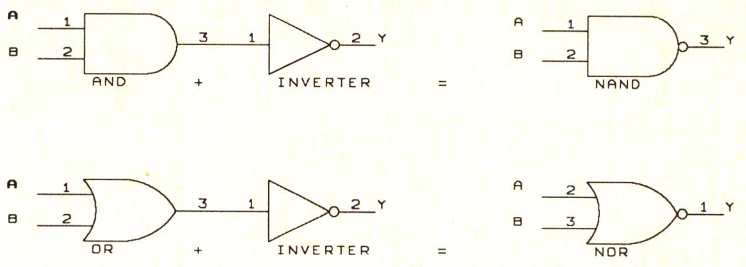

Figure 5

The gates described so far are simple in structure, with one or two inputs and one output. They are the fundamental elements for creating more complex chips and even the basis of complete computer CPUs. In the case of the simple 2-input `AND` gate, there are four discrete combinations of inputs — 00, 01, 10 and 11. The output for each given condition is 0, 0, 0 and 1, respectively. In other chips, where there might be five or six inputs and eight or ten outputs, it can be too much to remember.

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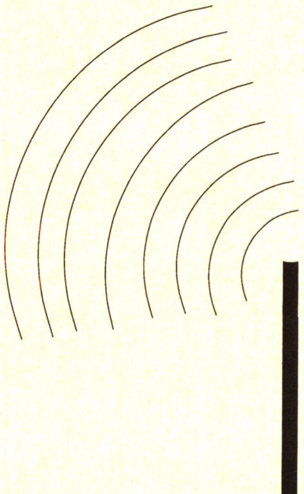

Plug Into Packet!

by Steven Ford

I wrote an article in November '89's issue that presented a number of ways in which your CoCo can become a versatile tool in the fascinating hobby of amateur (ham) radio. One of the most unique aspects of this CoCo/amateur radio partnership is found in packet radio.

To refresh your memory, packet is a form of computer-to-computer communication that takes place via radio rather than over wires. The computers send their information back and forth in quick bursts of data known as packets. Packet operation requires an amateur radio license and minimal equipment. My own packet station, for example, consists of the following:

- A 128K CoCo 3 (although any CoCo will do)
- Autoterm terminal software
- A terminal node controller (known as a TNC)
- A VHF-FM amateur radio transceiver

Packet TNCs are somewhat analogous to smart modems in that they contain their own microprocessors and sophisticated software. While some TNCs are computer-specific (designed to work exclusively with Commodore or IBM computers), many are universally compatible. In the case of the Color Computer, all that is required is a standard serial I/O connection — the same type you would use for a telephone modem. As with a telephone modem, part of the function of a TNC is to translate the outgoing data packets into tones that can be transmitted by radio. By the same token, incoming packet tones are also translated back into data for display on your CoCo.

Through your CoCo's terminal software you can communicate with the TNC and configure its features and operating parameters to suit your needs. I can, for example, issue a command that instructs the TNC to display only those messages that come from a preprogrammed list of my friend's call signs. Everything else on the frequency is ignored. This substantially reduces screen clutter on active evenings.

Prices of TNCs have been dropping steadily with some now as low as $120. A VHF-FM transceiver can cost several hundred dollars if purchased new, but many are available for under $200 on the used market. In fact, even a simple hand-held unit, or handi-talkie, can serve the purpose. Many of these are available used for $130 or less.

But what about antennas? As I mentioned in the November article, my antenna is basically a thin aluminum tube mounted in my backyard. You can do quite well in packet with much less. The only requirement is that your radio be able to communicate clearly with the nearest *digipeater*. Digi-what? The word digipeater is packet slang for *digital repeater*.

As you can probably guess, VHF signals are usually only good for local communications. Of course, hams have man-

---

Steve Ford is an amateur radio operator and has his advanced-class license. He holds a bachelor's degree in English and also an associate's degree in electronic engineering. He may be contacted at 12 Foxbridge Village Road, Branford, CT 06405.

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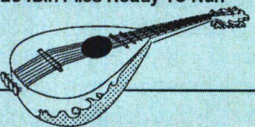

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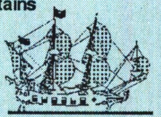

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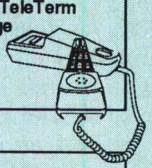

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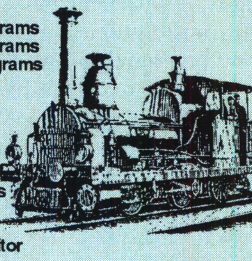

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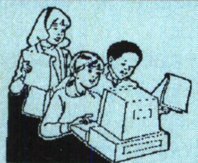

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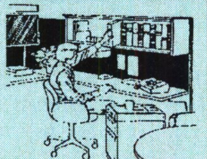

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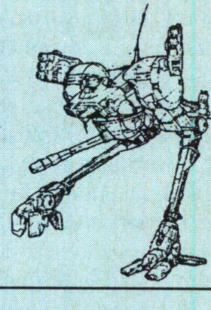

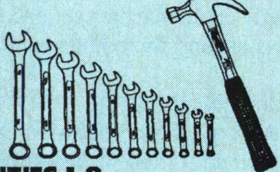

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aged to communicate over distances of thousands of miles on VHF, but this requires high power levels and special antennas. Even then, the signals tend to be somewhat noisy.

Noise or interference is the bane of packet signals since each packet not received 100 percent error-free must be retransmitted again. Even a momentary burst of static can wipe out several bits of data, making the packet unusable at the receiving end. This is why hams use frequency modulated (FM) transmissions at VHF frequencies for local area networks. VHF-FM is much less prone to noise and other forms of interference. Also, to prevent an endless series of retries under hopeless signal conditions, the TNCs incorporate a counter that measures the number of retries taking place. Most hams set this counter to 10. That is, if a packet cannot get through after 10 transmission attempts, the TNC breaks off communication.

But many hams do not have the large antennas and high power levels needed to assure efficient packet communication over wide areas. Some are even limited to simple indoor antennas. This is where the digipeater comes into play.

A basic digipeater consists of a powerful transmitter, a sensitive receiver and a TNC. Its antennas are usually mounted on tall towers, buildings or hilltops. A digipeater listens on a designated frequency for any packets directed to it. When it hears such a packet, it resends the received data through its superior transmission system, usually covering a radius of 50 miles or more. In this manner a tiny packet station with an indoor antenna can link up with another packet station miles away.

Communicating through a digipeater is simple. For example, I can establish a link with a friend across town like this:

```
CONNECT WA1XYZ VIA N1DCS
```

This command sends a connect request packet to my friend, WA1XYZ, through the N1DCS digipeater. If my friend's station is active, my request is acknowledged and a temporary link is established. On my CoCo screen I see:

```
CONNECTED TO WA1XYZ
```

Now he and I can exchange files or just chat as we please. The N1DCS digipeater serves as our go-between, relaying my packets to his station and vice versa. All of this is accomplished at 1200 baud without the use of telephone lines.

In most areas of the country, digipeaters form the anchor points for local area packet networks that usually include one or more packet bulletin boards. These packet bulletin boards are very similar to telephone BBSs. They serve as clearing houses for the cornucopia of information that flows throughout the worldwide amateur radio packet network. Public messages cover all topics from the environment to technical problems. In addition, if a ham friend is thousands of miles away, I can post a message on my local board that will arrive at his nearest bulletin board within a day or so. A special system of long-distance message routing takes care of everything automatically.

But ham radio isn't all just fun and games. In times of public need, hams get down to the business of providing emergency communications. Packet has demonstrated its strength in this area

Growth and Future Potential

Within the last year there have been many exciting advances in packet radio. In keeping with the ham radio spirit of ongoing experimentation, some new innovations have been tested and put into action.

One promising area concerns special high-speed UHF and microwave radio links that make it possible for local area packet networks to communicate with each other more efficiently. These links already exist in many areas of the country. While most of the high-speed links (known as *backbones*) operate at a maximum of 9600 baud, you can be certain that hams will be pushing the speed throttle to new heights by the time you read this article.

But does a 9600-baud system suddenly render your 1200-baud equipment obsolete? Not at all. The backbone links are intended to be transparent to the average packet user. You can still communicate with your friends and bulletin boards as before. However, your message traffic travels much faster to other local area networks. In the New Haven, Connecticut, area where I live, backbone systems already exist on 220 MHz and 440 MHz. Even so, I still communicate with my compatriots via my VHF equipment and my 1200-baud TNC.

One of the ongoing goals of amateur radio packet operation is to increase the speed and efficiency of long-distance links as well. This has been a special problem since long-distance packet links take place on shortwave frequencies. If you've ever listened to a shortwave broadcast, you know that the signals tend to be erratic, fading in and out as atmospheric conditions change. Since packet communication uses error-checking protocols, this causes numerous retries as the stations attempt to transfer their packets back and forth during the changing signal conditions. Just imagine what it would be like to use Delphi or CompuServe while your phone lines kept switching on and off!

Hams are focusing their attention on trying to find ways to improve packet communication on shortwave frequencies since greater efficiency is critical to improving the flow of packet traffic nationally and internationally. On the horizon, however, is a development that may further revolutionize amateur packet communication: packet satellites.

Amateur radio satellites have been in existence since the early days of the space program. Several are in orbit right now. Using these satellites requires special equipment and techniques. As the state of the art progresses, however, more powerful satellites are being developed that will be much easier for the average ham to use. One goal calls for the launch of an amateur radio packet satellite, or PACSAT, before the end of the century. With PACSAT, local networks and backbones can form reliable high-speed links that don't depend on the fickle nature of the ionosphere. This will greatly enchance the speed with which data flows around the country and the world.

Serious Business

With your CoCo, an amateur radio license, and a modest investment in equipment, you can enter a whole new world of computer and communication enjoyment. But ham radio isn't all just fun and games. In times of public need, hams get down to the business of providing emergency communications. Packet has demonstrated its strength in this area already.

During the onslaught of Hurricane Hugo, thousands of packet messages traveled back and forth as families in the U.S. used amateur radio to inquire about the safety of their loved ones. Packet was also used to relay lists of badly needed supplies for the hard-hit areas. Network news commentators frequently mentioned the fact that amateur radio was the only link to the outside world for many of the devastated islands. Although CoCo users are somewhat in the minority among packet stations, you can be sure that several were involved in this operation.

Listening In

If you have access to a programmable VHF police scanner, there is an easy way to determine the level of packet activity in your area. Just program the receiver to scan the following frequencies:

145.01 MHz
145.03 MHz
145.05 MHz
145.07 MHz
145.09 MHz

Listen between the hours of 6 p.m. and 9 p.m., the prime time for most packet activity. If you hear a high-pitched buzzing noise, you've probably picked up an amateur radio packet station or digipeater. These transmissions are usually very brief, lasting only a couple of seconds.

If you're lucky enough to own a shortwave receiver, try tuning it to 14.110 MHz during daylight hours to eavesdrop on long-distance packet links. Packet traffic on shortwave frequencies sounds a bit like chirping crickets or cats with high-pitched purrs.

Listening to buzzes and chirps gets boring very quickly. The next thing to do is seek out a ham club in your area, or a nearby ham radio operator who uses packet. This gives you an opportunity to actually see what you've been hearing. A thoughtful ham operator may even be willing to loan you a TNC and help you interface it to your CoCo. By using your scanner as a packet receiver, you'll be able to read all the packet activity in your area with your own CoCo.

To find out if an amateur radio club exists in your town, check the meeting notices in your local newspaper or check with your local Red Cross or police department. Chances are, someone knows the whereabouts of the nearest ham club. For those with scanners, try listening between 145 and 148 MHz. You'll probably hear local hams chatting back and forth to each other. And if you listen carefully, you may be able to gather information on when they meet and where. Don't be shy about dropping in on a club meeting without an invitation — or a ham license. Newcomers are always welcomed.

Sources of Information

One of the best sources of information about amateur radio in general and packet in particular is the American Radio Relay League, 225 Main Street, Newington, CT 06111. The ARRL can supply you with an avalanche of information about the hobby and may even be able to provide information about the clubs in your area. It publishes a number of excellent reference books including *Gateway To Packet Radio* — a superb beginner's manual. It also has Morse Code training tapes and study manuals for the license tests.

An association of CoCo packet enthusiasts is being formed by Dave DeMott, WA6PIC, in Atwater, California. Dave recently informed me of a ham in Ohio (KA8NPY) who has a sophisticated multitasking CoCo packet system running under OS-9. Hams in the area who do not have their own packet stations can link with KA8NPY via a telephone modem and operate his station through the CoCo — all of this while KA8NPY uses his word processor on the same CoCo.

I have also compiled a brief summary sheet that provides details on numerous sources for more information about amateur radio and packet. Just send a self-addressed, stamped envelope and I will be happy to forward it to you.

If you're looking for new uses for your CoCo, consider packet radio. Not only is it fun and informative, it provides the starting point for your introduction to the exciting world of amateur radio communications.

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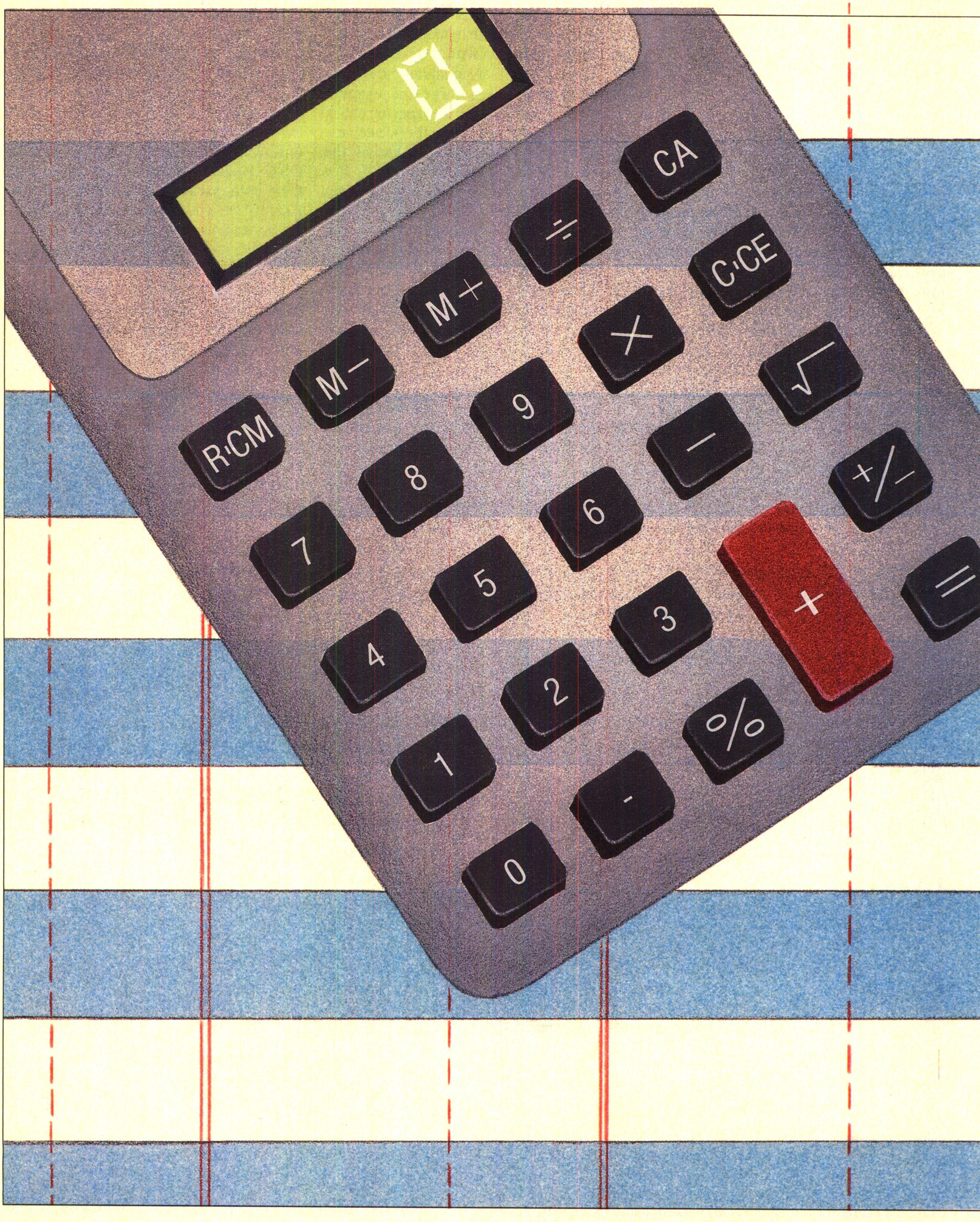
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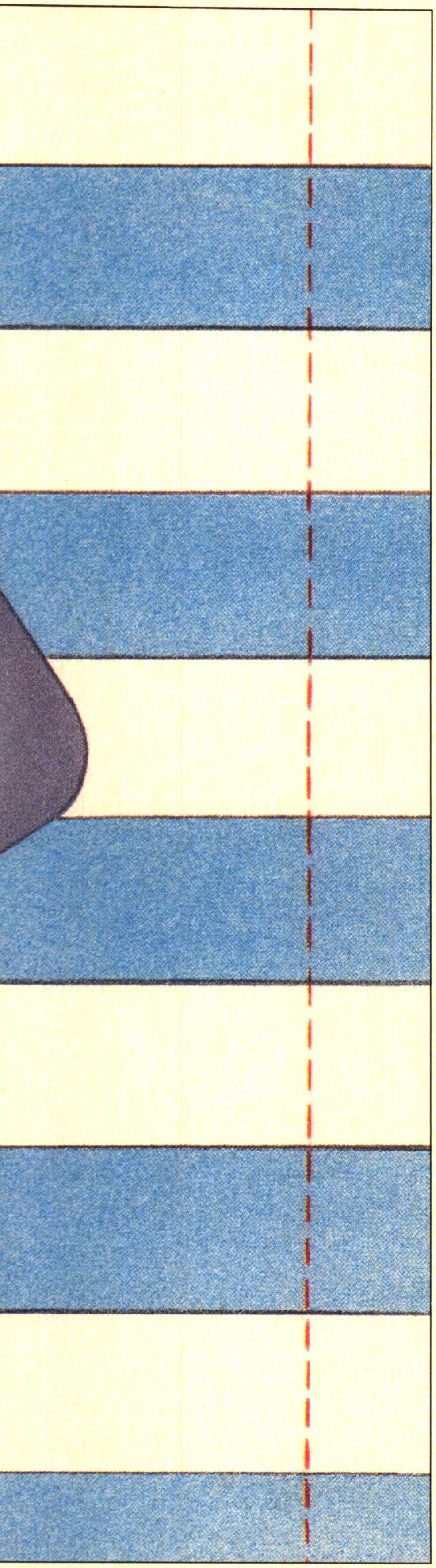

The Total Figure

by John Stewart

Have you been scared off by the complexity of spreadsheets? *If so, CoCoCalc* can simplify things. *CoCoCalc* is a menu-driven spreadsheet with most of the features of more complex spreadsheets. In addition to being easy to use, the program is written entirely in machine language for smooth operation. It uses the upper 32K of memory for over 40K of work space. The program supports cassette and disk-based systems and requires 64K to operate. *CoCoCalc* uses a 51-character Hi-Res display. To make this readable on a composite monitor or color TV, turn all color off on your monitor.

Pure machine language for smooth spreadsheet operation

To use *CoCoCalc*, type in the BASIC program `COCOCALC` and save a few copies before running it because the program deletes some of its own lines. When you run the program, it saves a binary copy of *CoCoCalc* to disk. To save the program to tape instead of disk, change the `SAVEM` in Line 16 to `CSAVEM`. Now type in and save a copy of the BASIC program `LOADER`. This program clears some memory and loads *CoCoCalc* from disk. If you are using tape, change the `LOADM` in Line 20 to `CLOADM`. You also need to save a binary copy of *CoCoCalc* after the `LOADER` program. To run from disk, type `LOAD"LOADER":RUN`, then press ENTER. To run the program from tape, type `CLOAD"LOADER":RUN` and press ENTER.

Labels and Formulas

A spreadsheet is a matrix of cells into which you can place a label (alphabetic characters), number or formula. A cell is designated by its row and column numbers. The row numbers appear on the left side of the screen, and the column numbers appear across the top of the screen. With *CoCoCalc* you have 255 rows and 255 columns. You can move from cell to cell within the spreadsheet by using the arrow keys. Your current position is indicated by the black cursor bar and is also displayed on the bottom line of the screen. The available memory is constantly displayed at the bottom of the screen and is updated whenever a new entry is made. Be careful not to exceed the available memory or you may

John Stewart is pursuing a master's degree in electrical engineering at the University of Kentucky. He enjoys working on both hardware and software projects for the CoCo. He may be contacted at RR 1, Box 13-F, West Liberty, KY 41472. Please enclose an SASE when requesting a reply.

lose some of your information. With over 40K available, however, you should have plenty of work space.

To put a label into a cell, place the cursor on top of the cell and type in the label. What you type is displayed near the bottom of the screen. When you press ENTER, the data appears in the cell. If the data starts with an alphabetic character, it appears in the cell justified to the left; numeric data appears justified to the right. If the label is too long to fit into the cell, the remaining letters are placed into the cell to the right of the current cell.

To place a formula into a cell, move the cursor over the cell and press +. Then type in your formula, which can contain anything supported by Color BASIC or Extended Color BASIC. Look in the Extended Color BASIC manual for a list of functions and their uses. To use the value of a cell in a formula, substitute the cell's row and column numbers in place of the cell's value. For example, if the cell at Row 10, Column 5 contains the value 100, you can find the square root of 100 by using either the formula `SQR(100)` or `SQR(10,5)`. *CoCoCalc* also allows you to use `IF THEN` statements in your formulas. A sample formula might look like this:

```
+IF 32,50<100 THEN 999 ELSEIF 32,
 50>=100 THEN 0
```

This formula assigns the value of 999 to the cell if the value of the cell at Row 32, Column 50 is less than 100. It assigns the value of 0 to the cell if the cell at Row 32, Column 50 is greater than or equal to 100.

Besides the functions of Color BASIC and Extended Color BASIC, there are two additional functions, `SUM` and `AVG`. These commands can be used to find the sum or average of a block of cells within the spreadsheet. To specify a block of cells, use the cells at its upper left and lower right corners. For example, to find the sum of all cells between Row 1, Column 2 and Row 10, Column 5, use `SUM (1,2,10,5)`. To find the average of this block, use `AVG (1,2,10,5)`.

Features

CoCoCalc has a variety of useful features that can be called up by pressing the slash (/) key at the > prompt. After you press the slash, a menu appears on the screen. Choose the command you want by pressing the number or letter next to the command name. The commands are as follows:

`GOTO` lets you move to another area of a large spreadsheet without using the arrow keys. Enter the row and column number you want to appear at the upper left corner of the screen.

`BLANK` erases any data or formula from the cell under the cursor.

`CLEAR` clears the entire spreadsheet of data and formulas. Be careful because cleared data cannot be recovered.

`WIDTH` allows you to adjust the width of the column in which the cursor is located. At start-up all columns have a width of 8. Be sure a column has enough room to display the answer of a formula in the column. If there is not enough room, the answer on the screen may not be correct. For example, if a cell contains the formula +10000 but the cell only has a width of 3, the cell displays 100 instead of 10000.

`SEARCH` lets you search for a string in the spreadsheet. You can use this command to find the location of a cell within a large spreadsheet.

`REPLICATE` copies a formula over a range of cells within a column. Any references to the row in which the formula is located are adjusted to its new row. For example, if the formula `+COS(12,2)` is located in Row 12 and replicated to Row 20, the formula in Row 20 reads `+COS(20,2)`.

`OPTIONS` lets you adjust your working environment. The first option is Fast Speed, which uses the speed-up poke (`POKE 65495,0` only). If your CoCo won't accept the speed-up poke, always answer No. Your second choice is Autocalculation. If you choose Yes, all the formulas are recalculated any time you enter data into the spreadsheet. This can slow you down if your spreadsheet becomes very large. If you choose No, you can force a recalculation by pressing ENTER at the > prompt. The next choice is Screen Size. You have a choice of 51 characters per line or 64 characters per line. Your last option is Formula Display. If you choose Yes, the formula is displayed at the bottom of the screen when the cursor is moved to a cell that contains a formula. This is convenient but it slows down cursor movement.

`INSERT` and `DELETE` allow you to insert or delete whole columns or rows at a time. Formula references are adjusted so they reference the same cell as before the `INSERT` or `DELETE` command. `INSERT` inserts a blank row or column immediately after the cursor, and `DELETE` deletes the row or column the cursor is on.

`RETURN` returns you to the spreadsheet Data Entry mode.

`QUIT` performs a warm start and returns to BASIC.

`SAVE`, `LOAD`, `CSAVE` and `CLOAD` save and load a spreadsheet to disk or tape.

`PRINT` prints a block of the spreadsheet to the printer. The printout looks just like the screen. Any blank cells are treated as if they contain spaces.

`DASCII` works just like the `PRINT` command except that instead of sending output to the printer, the output is sent to an ASCII disk file that can then be read by a word processor. This allows you to incorporate your spreadsheets into reports or text files.

`CASCII` works like the `DASCII` command except output is sent to the cassette.

`BLOCK` lets you perform several operations on a block of cells. The `COPY` command copies a block of cells to a new location. All cell references are adjusted to the new location. For example, Cell 10,10 contains the formula `+SIN(9,9)`, which takes the sin of the cell up 1 and to the left 1. If this formula is copied to Cell 20,20, the formula reads `+SIN(19,19)`, which also takes the sin of the cell up 1 and to the left 1. To use the `COPY` command, first place the cursor over the cell where you want the upper left corner of the copied block to start.

`MOVE` works just like the `COPY` command except the original block is cleared.

`CLEAR FORMULA` clears all formulas from a block but leaves the labels and numbers intact.

`SORT` lets you sort a block in ascending or descending order. You are asked for a block of cells specified by its upper left and lower right corners. Next you are asked for the column to be sorted. When a cell is moved in the sort column, not only is the cell moved, but the entire row within the block is moved along with the cell. Formulas referencing their own row are adjusted just as in the `REPLICATE` command. Formulas outside the specified block are *not* adjusted in the process.

`BASIC` opens a window to BASIC where you can load and run a program or do anything you would normally do in BASIC. When you are finished, you can return to the spreadsheet and continue working by pressing the SHIFT key. This window is very convenient for changing baud rates or displaying the disk directory, etc.

Summary

A spreadsheet can be a very powerful tool. *CoCoCalc* is a bare-bones spreadsheet that has all the necessary commands to make the spreadsheet useful. For more information on spreadsheets, look for articles in magazines or books on the subject. You may have to fiddle with the examples given, but you should be able to get most of them to work with *CoCoCalc*. ☐

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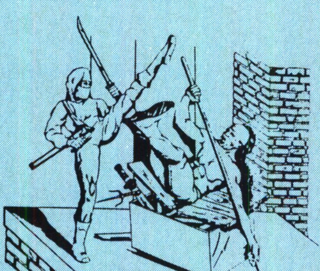

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16	172	87	161	140	233
31	41	92	182	144	128
37	167	96	244	148	184
40	146	100	81	152	157
46	88	104	47	156	144
51	85	108	202	160	173
55	124	112	122	164	216
60	43	116	65	168	196
65	129	120	141	172	133
69	132	124	172	176	192
75	64	128	184	END	159
79	113	132	192		
83	40	136	1		

Listing 1: COCOCALC

```
0 'COPYRIGHT 1989, FALSOFT INC.
1 '''''''''''''''''''''''''''''
2 '      COCOCALC 1.0         '
3 '          BY               '
4 '      JOHN STEWART         '
5 '    COPYRIGHT (C) 1986     '
6 '''''''''''''''''''''''''''''
7 CLS:PRINT@231,"WORKING PLEASE
WAIT":GOTO 18
8 PCLEAR1:CLEAR200,&H3FFF
9 CLS:PRINT@231,"WORKING PLEASE
WAIT"
10 FOR X=&H4000 TO &H5C68
11 POKE X,PEEK(X+&H2000)
12 NEXTX
13 FOR X=&H5C69 TO &H5EB2
14 POKE X,0
15 NEXTX
16 SAVEM"COCOCALC.BIN",&H4000,&H
5EB2,&H4000
17 END
18 PCLEAR1:CLEAR200,&H5FFF
19 F=33
20 FOR X=&H6000 TO &H7C68 STEP 5
0
21 F=F+1
22 READ A$
23 OT=0
24 FOR Z=0 TO 49
25 K=VAL("&H"+MID$(A$,Z*2+1,2))
26 POKE X+Z,K
27 OT=OT+K
28 NEXT Z
29 READ B$
30 IF OT<>VAL("&H"+B$) THEN PRIN
T"DATA ERROR IN LINE #";F:END
31 NEXT X
32 CLS:PRINT"READY YOUR DISK OR
TAPE AND TYPERUN 8  THEN PRESS E
NTER"
33 DEL 18-
34 DATA B7FF40B7FFDF1A508601B790
00B6900081012605 8EFE0020038E7FFF
BF5C95B7FFDE9EBA8C0600273BB6C155
8131261A8ECA,1717
35 DATA 07BF5C8D8ECDBCBF5C8F8ECA
04BF5C918ECC24BF5C9320318EC959BF
5C8D8ECCE2BF5C8F8EC956BF5C918ECB
52BF5C932017,1A1C
36 DATA 867EB7501CB74F12B74EF78E
4126BF501DBF4F13BF4EF810FF5CAABE
018FBF5C8BBE0168BF5C89BD4EAD8E5E
B2BF5DB0BF5D,1894
37 DATA AE8E4D52BF01688E5DB28608
A7808C5EB225F910FE5CAAB7FFDF1A50
8E4FFCBF018F0F6FBD4549BD44C4BD44
8CBD4908BD44,1874
38 DATA 47C6B8BD4631BD4324C6B0BD
4631BD42E5BD42F97D5C81270BBD4114
BD46F62503BD4647BD52FC810D272E81
0A1027025B81,153A
39 DATA 5E102702BF81081027032681
09102702FE812F1027001516044DF65C
63FB5C78B65C62BB5C7739BD491C2083
BD4B3C861EB7,1086
40 DATA 5C6FBD414ABD52FC813025F9
814C22F5813923028007803 08E417C48
6E96865AC6148E54370F6F7F5C827F5C
7D7C5C7EB75C,14ED
41 DATA 67B75C6DF75C68A6802705BD
53CF20F78664B75C678606B75C687F5C
7E394DE941C440A9501C4F124EF75BDA
5BC65C52516D,16DF
42 DATA 42A94BB041CF5B114BBC59E9
507C42955A8241AC0000000000000000
BD41F7BD427FBD4206160 0D18E5682BD
422B4D1027FF,1289
43 DATA 6339BD41B80F71B7FFDE7EA0
27BD41B816FEB63410BD4B893510BD52
F68646B75C6F7E4556BD52FC81592706
814E26F54F39,1735
44 DATA 8601398E5587BD422BB75CAC
8EFFD6A786398E566CBD422B4D261386
3CC6048E000CB75C64F75C651F10F75C
6639862FC605,14D2
45 DATA 8E000F20EBBD41D57E41E7BD
41D57E42CB3414BD52F6F75C6FBD5348
BD52F63514F75C6F7E4556BD53637E52
E9B65C653DFB,18EA
46 DATA 5C66F75C6D3981241027 04BB
812E102704B5812D102704AF81301025
04A2813910230 4A31604998E5596BD42
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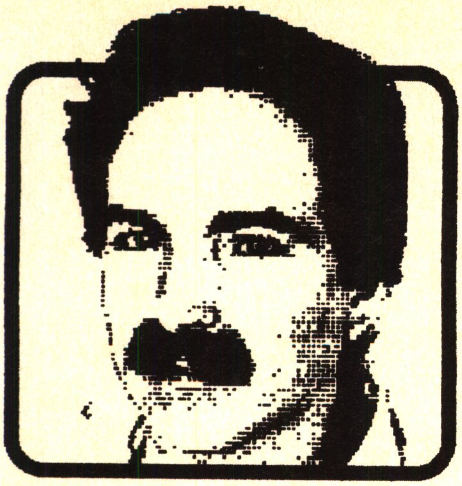
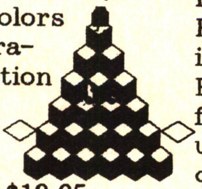


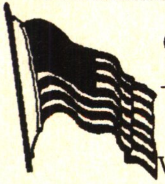
Pyramix

This is a fascinating CoCo 3 game of skill and coordination. Pyramix is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordon Tsvetkoff and a product of ColorVenture. **Disk: $19.95**



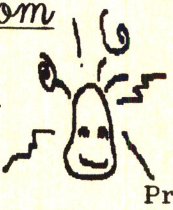
The Freedom Series

Vocal Freedom



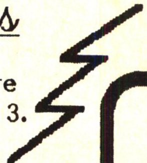
Vocal Freedom turns your computer into a digital voice recorder. The optional Hacker's Pac lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the prerecorded message directly from its Random Access Memory with amazing fidelity! You may also SAVE or LOAD sounds to and from DISK. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone. Will run on a CoCo 1, 2, or 3. Vocal Freedom **Disk: $34.95.** Optional Hacker's **Pac Disk: $19.95. Disk for both: $49.95**

Mental Freedom



Would your friends be impressed if your computer could read their minds? Mental Freedom uses the techniques of Biofeedback to control video game action on the screen. Telekinesis? You control the action with your thoughts and emotions. Your goal is to materialize and levitate objects with the power of your mind while avoiding the insidious cobra. Mental Freedom teaches peace of mind in the face of adversity. Mental Freedom even talks in a perfectly natural voice without using a speech synthesizer! Requires Radio Shack's low cost Biofeedback monitor, Cat. #63-675. Will run on a CoCo 2 or 3 but not CoCo 1. **Disk: $24.95**

Lightning Series



These three utilities give real power to your CoCo 3.

Ramdisk Lightning

This is the best Ramdisk available. It lets you have up to 4 mechanical disk drives and 2 Ram drives on-line and is fully compatible with our Printer Lightning. **Disk: $19.95**

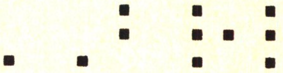
Printer Lightning

Load it and forget it--except for the versatility it gives you. Never wait for your printer again! Printer runs at high speed while you continue to work at the keyboard! **Disk: $19.95**

Backup Lightning

Reads your master disk once and then makes super fast multiple disk backups on all your drives! No need to format blank disks first! Supports 35, 40 or 80 track drives. This utility requires 512K. **Disk: $19.95**

COCO Braille



Produce standard grade 2 Braille on a Brother daisy wheel printer. Easy to use for sighted or blind user. No knowledge of Braille is necessary. Call for free sample. Will run on CoCo 1, 2, or 3. **Disk: $69.95**

VDOS the UnDisk

VDOS, The Undisk, ramdisk for the CoCo 1 or 2 only. Available only on **tape: $24.95**

VDUMP, backup Undisk files to single tape file. Requires VDOS. **Tape: $14.95**

VPRINT, Print Undisk directory. Requires VDOS. **Tape: $9.95**

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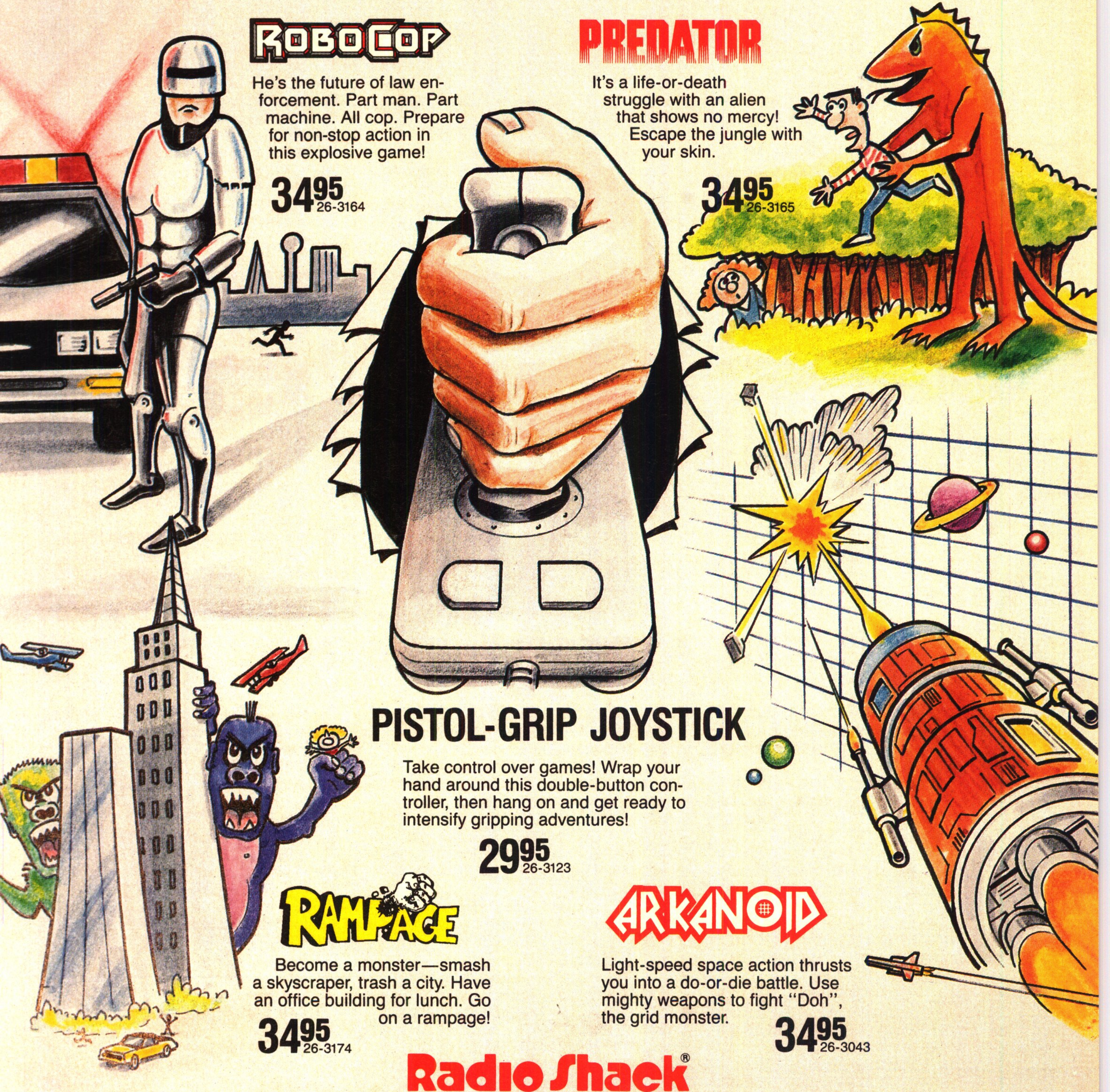

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131 DATA 5C6D35828664B75C6D39B7F
FDEAD9FA00027F7B7FFDF39B7FFDEBDB
26DB7FFDEBDB73D1F10B7FFDF399FA6B
7FFDE9DA5B7FF,1F12
132 DATA DF39A685B15C99230E7D5CA
927046A8520026C8516F3DD16F3E1340
2A60230033086358 28E56AE7E4556BD4
50A7E452886FF,143E
133 DATA A780BC5C8526F9398B307E5
363B75C693410BD4E0335904D1027F57
DE680E7A04A20F4BC5DAE270BBC5DB02
70CA680A7A020,1661
134 DATA F010BF5DAE20EF10BF5DB03
910BC5DB01027F553A6A0A78020F2A60
23186312339BD52F6B75C6F7F5C82B7F
FDEBDA393B7FF,19D2
135 DATA DF398E5CAEBD531BB7FFDEB
DBD128E5D9EB7FFDF39B7FFDE1CAF7D5
C7D260AAD9FA0021A50B7FFDF393404F
65C7DC1022607,1954
136 DATA BD540F350420EA3504B7FFD
E1CAF3436AD9F5C93353620D95F4D102
7F4E54AEB8020F63410B7FFDE1CAFBDA
2901A50B7FFDF,181C
137 DATA 3590B65C638E5DB2817F230
530887F807F3086394D454D3D0030204
241534943202020412047 4F544F0D312
0515549542020,ECD
138 DATA 2020422042 4C414E4B0D322
052455455524E20204320434C4541520
D33204C4F41442020202044204445 4C4
554450D342053,B1E
139 DATA 415645202020204520424C4
F434B0D35204441534349492020462 05
345415243480D3620434C4F414420202
047205245504C,B57
140 DATA 49434154450D37204353415
64520202048205749445448 0D3820434
1534349492020492049 4E534552540D3
9205052494E54,C06
141 DATA 2020204A204F5054494F4E5
300202020 20424C4F434B2020434F4D4
D414E44530D312E20434F50590D322E2
04D4F56450D33,B3E
142 DATA 2E20434C45415220454E545
259530D342E20434C45415220464F524
D554C41530D352E20534F52540D362E2
052455455524E,C82
143 DATA 0D20202020594F555220534
54C454354494F4E3F000000000000000
00000000000000000000000000000000
0000000000000,4E1
144 DATA 00000000000000000000004
64153542053504 54544 20592F4E00415
5544F43414C43554C4154494F4E20592
F4E0044495350,A43
145 DATA 4C415920464F524D554C415
320592F4E00454E5445522043 4F4C554
D4E20574944544 83F00474F544F20574
8455245202052,D16
146 DATA 4F572C434F4C203F0046494
C454E414D45203F00492F4F204552524
F5200454E544552205354415254 20524
F573F00454E54,C8A
147 DATA 45522045 4E4420524F573F0
05550504552204C45465420434F524E4
55220522C433F004C4F57455220524 94
748542 0434F52,CF0
148 DATA 4E455220522C433F0053594
E5441582045525 24F5200464F524D554
C41204552524F5220415420003531204
3484 1522E2053,C70
149 DATA 435245454E2020592F4E3F0
041524520594F5520535552452059 2F4
E3F00484954205348494654 20434C454
15220544F2052,C8A
150 DATA 455455524E0020202020202
020202020202020202020202000057105
71D5726572FB75C6EB65C6D444444B75
C6CB65C6FC620,D5E
151 DATA 3DD3BA1F01F65C6C3ABF5C7
07E56F5FFFFFFFFFFFFFFFF666F6000F
65C6EC1032F08C004588E56C16E955C7
E570AC601F75C,1A37
152 DATA 737E4E9FC605BD570A8605B
75C737E4EA5C606BD570A860420F1C60
7BD570A860320E8C608BD570A860220D
F092324374646,12D0
153 DATA 4600130B54484D095354580
00000022222020999000000 66F6F6602
7861E20DD24BBB04AA4A960664800003
4CCC430C23332,FCB
154 DATA C009669000044E440000006
648000F0000000003300112244069BBD
D60262222706916 88F0691619601359F
110F8E1196034,DD9
155 DATA 8E9960F1248880699699606
99712C006600660660664801248421 00
0F0F00084212480691240406915DD606
99F9990E99E99,1466
156 DATA E069888960E99999E0F88E8
8F0F88E8880788B9970999F999072222
2701111196099ACA990888888F09FF99
9909DDBB99069,1C60
157 DATA 999960E99E88806999B710E
99EA99069861960F6666660999999609
99996609999FF9099969990999971A40F
11248F0F88888,1B6D
158 DATA F027F22220F11111F027F22
2205458095A5A32002800617970 88E99
9E00069896011799970 0069F870254E4
4400799971E88,132A
159 DATA EA999060E666F060E2226C8
89ACA906222227000 9FF99000ADD9900
06999600E999E880799971100AD88800
07861E066F666,17F6
160 DATA 30009999600099966 00099F
F9000996990099 9971E00F17F5C7DBD5
147B65C97B75C878E5B8DBD4231F15C9
A1022F730F15C,1676
161 DATA 981025F729F75C7F8E5B9FB
D422BB75C7A7F5C7CB65C97F65C7FBD4
70124037C5C7C1F127C5C97B65C97B15
C99224CF65C7F,167D
162 DATA 3420BD4701352025D67D5C7
C2709B65C97F65C975A202A3430E622A
6237D5C7A260FA1032515220F5A270C3
001312120EAA1,FEB
163 DATA 03220627F1353020A43530A
684E6A4BD595C7C5C7D20967D5C7D102
7F26C7F5C7DB65C87B75C9716FF838E5
EB2FD5C70BC5D,16A0
164 DATA AE2744FC5C70BD59BAA6023
0034D2709E680C12227084A20F4FC5C7
020E0B75C69BD51142412FC5C703001B
D59BA3002B65C,1488
165 DATA 698003B75C69FC5C70BD59B
A3003B65C69800420C6BC5DB01027EF3
DBD59BABD533E20F1A1842609BD59D32
50FE784200BE1,165B
166 DATA 842607BD59D32502A784393
404E601F15C982509F15C9A22041CFE2
0021A0135848E5B40BD42318E02DD108
E5EB210BC5DB0,12C1
167 DATA 1027004D3430A6223123E68
027174AE1A027F74D27058E02DD20EF3
530A62231A6312320D78E5B51C65ABD4
237BD52E93530,12C2
168 DATA A6A4E621342 0BD46E4C6648
E5B5BBD4237BD41E735204D27118E02D
D16FFCCC6648E5B6BBD4237BD52FC16E
6CD8E5B7CBD41,1828
169 DATA D5BD52FC81432713815227 0
9815C26EB351016E6B35FBD411A2005C
601BD52D6B75C9939BD5A597F5CA98E5
EB2BC5DAE273A,15AA
170 DATA BD5326A6023410300 33402A
6808122261DBD511424 0D3001BD53263
00235028003340 2BD53263003350280 0
3200235024A26,B5F
171 DATA D63510BD533E20C1BC5DB02
708BD5326BD533E20F35D2734B65C99B
D54237D5CA9270BA601A7808C5EB226F
7201E1F128E5D,1405
172 DATA B2312110BF5C85308900FFA
61FA784301FBC5C8526F58608A78416E
615BD5A598E5EB2BC5DB0271CA685B15
C9926103414A6,153C
173 DATA 84E601BD4D32BD4D4335142
0E4BD533E20DF8601B75CA916FF48534
5415243482046 4F52205748415 43F004
64F554E442041,115B
174 DATA 542000434F4E54205345415
243482059 2F4E00534F5252592C204E4
F5420464F554E4400434F4C204F52205
24F572020432F,C55
175 DATA 523F00454E5445522053 4F5
25420434F4C554D4E00415343454E444
94E47204F52444552 20592F4E3F00BD5
C0A4FB7FFDE1C,EE4
176 DATA AFBDA65B1A50B7FFDF39BD5
BB48E5DAEA680BC5DB01027F62CBD540
F20F2BD5C0AB7FFDE1CAFBDA6291A50B
7FFDF8E5DAE0F,1A39
177 DATA 703410B7FFDE1CAFBDA17F1
A50B7FFDF3510A780BC5DB025E616F5F
78E55E9BD41D5BD53A91025F36F8E01D
16F808620A780,1A3C
178 DATA 8C01DA25F98E02DD108E01D
2A680270DA7A0108C01DA27057C01D12
0EF86FF9768B7FFDE1CAFBDA7CA1A50B
7FFDF3916F334,188A
179 DATA 0F6FBD5147BD5BB48602B75
C7D16F51F01012F050F6406000000000
00000000000000000000000000000000
0000000000000,790
```

Listing 2: LOADER

```
10 PCLEAR4:CLEAR200,&H3FFF
20 LOADM"COCOCALC.BIN"
30 EXEC&H4000
```

Novices Niche

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Graphics

This Is Your Big Debut

by Bill Bernico

CoCo 3

The old movie theaters used to have a marquee out front with flashing lights around the title of the movie playing that day. That was what I had in mind when I wrote *Marquee3* for the CoCo 3.

It displays a title screen with moving lights around it. I use an on/off sequence of palette switching that gives the illusion of motion.

Lines 7 through 23 draw and paint the square around the title page. Line 28 switches Palette 3, which is normally red (36), to black (0). Then it changes Palette 12 from black to red. Line 29 reverses this procedure. When run in a loop, the colors alternate and give the appearance of motion. They remain in motion until a key is pressed. Line 31 branches off to the rest of your own program.

The Listing: `MARQUEE3`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 'MARQUEE TITLE PAGE DEMO
   (C) 1989 FROM
   BILL BERNICO SOFTWARE
2 CLS:PRINT"THIS DEMO PROGRAM WI
LL SHOW YOU HOW TO MAKE A MARQUE
E-TYPE TITLEPAGE FOR YOUR OWN PR
OGRAM PRE-  SENTATION.  WITH THE
 USE OF THE PALETTE SWITCHING AB
ILITIES OF  THE COCO3, YOU CAN C
REATE THE   ILLUSION OF A MOVING
 BORDER
3 PRINT"AROUND YOUR GRAPHICS TIT
LE PAGE.YOU CAN CHANGE THE COLOR
S TO    ANYTHING YOU LIKE, JUST
MAKE    SURE THAT THE HPAINT NUM
BERS ARETHE SAME AS THE NUMBERS
SWITCHEDIN THE PALETTE COMMANDS
THAT    IMMEDIATELY FOLLOW.
4 PRINT@486,"HIT ENTER TO TRY IT
";
5 IFINKEY$<>CHR$(13)THEN5
6 CLEAR1000:ONBRKGOTO32
7 HSCREEN2:HCLS4:HCOLOR8,4:RGB
8 B$="R10D10L10U10R10
9 C$="U10R9D10L9U10
10 D$=C$+C$+C$+C$+C$+C$+C$+C$
11 A$=B$+B$+B$+B$+B$+B$+B$+B$+B$
+B$+B$+B$+B$+B$+B$+B$
12 HDRAW"BM0,0"+A$:HDRAW A$+B$+"
R9D10L9U10
13 HDRAW"BM0,181"+A$:HDRAW A$+B$
+"R9D10L9U10
14 HDRAW D$+D$+"U10BR9D10
15 HDRAW"BM0,181"+D$+D$+"U11R9D1
1
16 FORX=1TO311STEP20:HPAINT(X,2)
,12,8:NEXTX
17 FORX=12TO191STEP20:HPAINT(315
,X),12,8:NEXTX
18 FORX=309TO0STEP-20:HPAINT(X,1
90),12,8:NEXTX
19 FORX=163TO0STEP-20:HPAINT(2,X
),12,8:NEXTX
20 FORX=11TO311STEP20:HPAINT(X,2
),3,8:NEXTX
21 FORX=2TO191STEP20:HPAINT(315,
X),3,8:NEXTX
22 FORX=312TO0STEP-20:HPAINT(X,1
90),3,8:NEXTX
23 FORX=173TO0STEP-20:HPAINT(2,X
),3,8:NEXTX
24 HPRINT(9,6),"MARQUEE TITLE PA
GE DEMO
25 HPRINT(13,8),"(C)1988 FROM
26 HPRINT(9,10),"BILL BERNICO SO
FTWARE
27 HPRINT(7,20),"HIT ANY KEY TO
START OVER
28 PALETTE 3,0:PALETTE 12,36:GOS
UB31
29 PALETTE 3,36:PALETTE 12,0:GOS
UB31
30 IFINKEY$=""THEN28ELSE7
31 FORY=1TO50:NEXTY:RETURN
32 RGB:CLS:END
```

Running BASIC Programs Can Be a Breeze

by Hinh Phansavath

16K
Disk

After you turn on your computer, what is the first thing you type? Is it a `DIR` and/or `LOAD`? These two commands are very useful, but they can cause a little agony. Consider this situation: You hastily boot up your CoCo, and, impatient to call up a program, type in `LOAD`. Just then you discover you have forgotten the program name, so you press ENTER and get an error message. Then you type in `DIR`, but the screen scrolls so fast that you miss the name. Isn't that frustrating? To solve this problem I came up with *MCP*.

MCP allows you to load and run BASIC programs by entering their assigned numbers. You'll see a listing of all the program names as they appear during a `DIR` command. Preceding each name is a number. You'll see a prompt asking for a file number. Enter the number that precedes your desired file, and that file is loaded and run.

Many times your disk contains more files than the screen can display at once. In such a case, simply enter 0 for the file number and another set of files is displayed on the screen.

If you enter the number of a machine language file, you get a message stating you can't load M/L files. Entering the number 99 for the file causes the program to end and the cursor to appear at the bottom of the screen. This lets you `LOADM` a program while its name is still on the screen.

The next time you boot up your computer, instead of typing `DIR` or `LOAD`, try `RUN"MCP`.

The Listing: `MCP`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 CLEAR 2000:DIMA$(72),D(72)
20 A=0:K=0:F=0
30 FORX=3 TO 11
40 DSKI$0,17,X,N1$,N2$
50 T$=N1$+LEFT$(N2$,127)
90 FOR N=0TO7
100 NAM$(N)=MID$(T$,N*32+1,8)
110 EXT$(N)=MID$(T$,N*32+9,3)
120 C(N)=ASC(MID$(T$,32*N+12,1))
130 NEXT N
140 FOR N=0TO7
150 IF C(N)<>2 AND C(N)<>0 OR LE
FT$(NAM$(N),1)=CHR$(0) THEN 180
160 A$(A)=NAM$(N)+"/"+EXT$(N):D(
A)=C(N)
170 A=A+1
180 NEXT N
190 NEXT X
200 DATA 32,64,96,128,160,192,22
4,256,288,320,352,384,416,448,11
210 CLS
220 FORB=0TOA-1
230 IF K=0 THEN READ P
240 IFP=11THENRESTORE:READP:PRIN
T@480,"enter 0 for more";:F=1:GO
SUB320
250 PRINT@(14*K+P),B+1;LEFT$(A$(
B),8)
260 IF K=>1 THEN K=0ELSEK=K+1
270 NEXT B
280 IFF=1THENPRINT@480,"enter 0
to see previous screen";:RESTORE
:K=0
290 GOSUB 320
300 GOTO 220
310 END
320 PRINT@0,"":PRINT@0,"ENTER FI
LE NO.";:INPUTR
330 IFR=99 THEN PRINT@480,"";:EN
D ELSE IFR<0ORR>A THEN320
340 IFR=0ANDF=0THEN320:ELSEIFR=0
THENCLS:K=0:F=1:RETURN
350 IF D(R-1)=0 THEN LOADA$(R-1)
,R ELSE PRINT@0,"can't load ml f
ile--try again";:FOR D=1TO2500:N
EXTD:GOTO320
```

Let CoCo Calculate HBUFF

by Greg Hall

CoCo 3

HBuff is a program designed for the Color Computer 3. Use it while writing a program using the `HGET` and `HPUT` commands. Upon running this program, you are asked to enter the `HSCREEN` you are using, the coordinates of the `HGET` rectangle, and the buffer number of the rectangle. The computer displays the `HBUFF` numbers for you to put in your program — and that's it! It's a lot easier than doing all the math yourself and quite a bit faster too.

The Listing: `HBUFF`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 WIDTH40
20 PALETTE4,0:PALETTE8,63
30 CLS(5)
40 LOCATE0,0
50 INPUT"HSCREEN";HS
60 IFHS=1ORHS=4THENDO=4ELSEIFHS=
2THENDO=2ELSEIFHS=3THENDO=8ELSE4
0
70 CLS(5)
80 PRINT"HGET(x1,y1)-(x2,y2),buf
fer
90 PRINT
100 INPUT"x1";X1
110 INPUT"y1";Y1
120 INPUT"x2";X2
130 INPUT"y2";Y2
140 INPUT"buffer";BU
150 CLS(5)
160 A=INT(X1/DO):A=A*DO
170 B=INT(X2/DO):B=B*DO
180 IFA>B THENC=A-B ELSEC=B-A
190 C=C+1:C=C/DO
200 IFINT(C)<>C THENC=C+1:C=INT(
C)
210 IFY1>Y2 THEND=Y1-Y2 ELSED=Y2
-Y1
220 D=D+1
230 E=C*D:E=E-1
240 PRINT"HBUFF";BU;",";E
```

Game

Escape

by Chris Driscoll

16K Extended

Escape is an interesting game of skill and challenge. You must escape from a castle that is about to collapse. Sound easy enough? There is a catch. You're on the 20th floor and each floor is a labyrinth. Using the right joystick, move to the blue exit that transports you one level closer to freedom. The walls of the maze appear to close in as you hastily beat a retreat. Diagonal movement is required to escape certain floors. Good hand-eye coordination is also useful if you plan to scurry across the drawbridge before the walls come tumbling down. Make haste!

The Listing: ESCAPE

```
 0 ' COPYRIGHT 1989  FALSOFT,INC
10 POKE 65497,0
20 CLS0:PRINT@43,"escape";
30 PLAY"T201V31L7DFCL10GAL25CV25
CV19CV11CV7CV2CL30P3"
40 PLAY"T255L25501V31"
50 Q=20
60 W=RND(Q):IF W=1 THEN X=208 EL
SE IF W>1 THEN X=223
70 A$=A$+CHR$(X)
80 PLAY"O1D"
90 ON ERR GOTO 360
100 S=S+1:IF S>32 THEN 140
110 PRINT A$;
120 GOTO 60
130 A$="":GOTO 60
140 A=RND(30)+15:B=RND(20)+5
150 IF POINT(A,B)=0 THEN 140
160 R=RND(63):Y=RND(30):IF POINT
(R,Y)=0 OR POINT(R+1,Y)=0 OR POI
NT(R+1,Y+1)=0 OR POINT(R,Y+1)=0
THEN 160
170 SET(R,Y,3)
180 C=JOYSTK(0):D=JOYSTK(1)
190 TM=TM+1:IF TM>650 THEN GOTO
330
200 IF C<1 THEN A=A-1 ELSE IF C>
58 THEN A=A+1
210 IF D<1 THEN B=B-1 ELSE IF D>
58 THEN B=B+1
220 IF A<1 THEN A=1 ELSE IF A>62
 THEN A=62
230 IF B<1 THEN B=1 ELSE IF B>31
 THEN B=31
240 IF POINT(A,B)=3 THEN 310
250 IF POINT(A,B)=0THEN GOSUB 28
0
260 SET(A,B,4):FOR T=1 TO 30:NEX
T T:SET(A,B,6)
270 GOTO 180
280 IF C<1 THEN A=A+1 ELSE IF C>
```

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```
58 THEN A=A-1
290 IF D<1 THEN B=B+1 ELSE IF D>
58 THEN B=B-1
300 RETURN
310 PLAY"O5AFDC":S=0:Q=Q-1:IF Q<
2 THEN 370 ELSE GOTO 60
320 REM 208,223
330 CLS:PRINT"          TIME UP"
340 PRINT"   LEVEL"Q;
350 GOTO 350
360 A$="":GOTO 100
370 CLS 8:FOR X=1 TO 63:FOR Y=1
TO 5:RESET(X,Y):NEXT:NEXT
380 FOR X=31 TO 36:FOR Y=1 TO 5:
SET(X,Y,8):NEXT:NEXT
390 FOR X=31 TO 36:RESET(X,5):NE
XT X:FOR X=31 TO 36:SET(X,5,8):N
EXT X
400 FOR Y=6 TO 8:RESET(30,Y):NEX
T Y:FOR Y=6 TO 8:RESET(37,Y):NEX
T Y
410 FOR Y=1 TO 31:SET(34,Y,4):PL
AY"O1DBF":SET(34,Y,8):NEXT Y
420 FOR X=1 TO 400:NEXT X
430 CLS:PRINT"  YOU MADE IT OUT
OF THE CASTLE":PRINT"SCORE:";TM*
5+100+(TM-RND(10))
440 PRINT"TIME LEFT:"INT(TM/100)
":"TM-INT(TM/100)*100
450 GOTO 450
460 CSAVE"ESCAPE":FOR X=1 TO 100
0:NEXT X:GOTO 460
```

Home Help

Let's Make a List

by David E. Jacob

CoCo 3
Disk

Cursed are the readers who fail to keep track of the books they read. Sound familiar? Well, I know the feeling. I love to read. I can't pass by a bookstore or flea market without snapping up a book or two, or three, or . . . you get the idea. The pile of used books in my room has become so large and disorganized, I can't remember just what I have anymore — can you remember the title of a book you bought three years ago? Well, that *was* my problem.

My solution to this problem is a short program called *Lister*. Option 1 creates a direct-access ASCII file called `BOOKLIST`, with the name of the book, the author's name, the genre (science-fiction, horror, etc.), whether it is a hardbound edition or paperback, and its price.

When you run out of titles to enter, just press `ENTER` and you are back at the menu.

Option 2 lets you scroll through the file you have created at any time. When you are ready to obtain a hard copy of your list, select Option 3. Option 4 ends the program.

If you have such a large library that you find you can't list all the books in one sitting — not surprising, since an empty disk can hold a couple of thousand entries — the procedure for getting back to the end of the `BOOKLIST` file after you have rested your fingers and turned on the computer is simple. Select Option 2 and the scrolling list is placed back in memory. Then get back into Option 1 and start typing. Remember, when first booted up, *Lister* always begins at the beginning — unless you tell it otherwise. If you forget to do so, *Lister* simply overwrites previous data.

The Listing: `LISTER`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 REM MENU
20 WIDTH40
26 N=1
30 PALETTE0,63:PALETTE8,0:CLS5
40 PRINT"  PRESS 1 TO INPUT BOOK
S TO LIST"
50 PRINT"  PRESS 2 TO PRINT BOOK
S ON LIST TO               SCREE
N"
60 PRINT"  PRESS 3 FOR HARDCOPY
OF LIST"
70 PRINT"  PRESS 4 TO END PROGRA
M"
80 INPUT"    ";T
90 ON T GOSUB 120,380,640,110
100 GOTO40
110 END
120 REM INPUT BOOKS SUB
130 OPEN"D",#1,"BOOKLIST/DAT" ,6
4
140 H=0
150 B=0
160 INPUT"  NAME OF BOOK (PRESS
ENTER TO GET TO     MENU):";N$
170 IFN$=""THEN360
180 INPUT"  NAME OF AUTHOR:";A$
190 INPUT"  GENRA:";G$
200 INPUT"  PRICE:";P
210 INPUT"  HARDBOUND(Y/N):";H$
220 WRITE#1,N$,A$,G$,P,H$
230 PUT#1,N
240 GET#1,N
250 INPUT#1,N$,A$,G$,P,H$
260 CLS
270 PRINT"  TITLE-";N$
280 PRINT"  AUTHOR-";A$
290 PRINT"  GENRA-";G$
300 PRINT"  PRICE-";P
310 PRINT"  HARDBOUND-";H$
320 INPUT"  DOES THIS INPUT NEED
 TO BE REDONE?      (Y/N):";R$
330 IFR$="Y"THEN160
340 N=N+1
350 GOTO160
360 CLOSE#1
370 RETURN
380 REM PRINT BOOK LIST TO SCREE
N
390 OPEN"D",#1,"BOOKLIST/DAT" ,6
4
400 N=1
410 H=0
420 B=0
430 Z=0
440 GET#1,N
450 INPUT#1,N$,A$,G$,P,H$
460 Z=Z+P
470 IFH$="Y"THEN H=H+1
480 IFH$="N"THEN B=B+1
490 PRINT
500 PRINTN".";N$
510 PRINTA$"....";G$;"  $";P
520 PRINT
530 IFN=LOF(1)THEN560
540 N=N+1
550 GOTO440
560 CLOSE#1
570 PRINT"**********************
******************"
```

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```
580 PRINT"  THERE ARE";H;"HARDBO
UND, AND";B;"PAPERBACK   BOOKS O
N THIS LIST"
590 PRINT
600 PRINT"  THE TOTAL VALUE OF T
HESE BOOKS              IS $";Z
610 PRINT"**********************
*****************"
620 N=N+1
630 RETURN
640 REM LINE INPUT ROUTINE
650 OPEN"D",#1,"BOOKLIST/DAT" ,6
4
660 N=1:H=0:B=0:Z=0
670 GET#1,N
680 INPUT#1,N$,A$,G$,P,H$
690 Z=Z+P
700 IFH$="Y"THEN H=H+1
710 IFH$="N"THEN B=B+1
720 PRINT#-2,N".";N$"...": A$; "
 ";G$; "   $";P
730 REM
740 IF N=LOF(1)THEN770
750 N=N+1
760 GOTO670
770 CLOSE#1
780 N=N+1
790 PRINT#-2,"**"
800 PRINT#-2,"THERE ARE";H;"HARD
BOUND, AND ";B;" PAPERBACK BOOKS
 ON THIS LIST"
810 PRINT#-2,"THE TOTAL VALUE OF
 THESE BOOKS IS $";Z
820 PRINT#-2,"***"
830 CLS
840 RETURN
```

Balancing the Budget

by Kathy Rumpel

16K
Extended

Here's a program that prints out a journal page for your accounting needs. You will never have to get out the ruler and draw lines again.

Journal was written for a DMP-105/106 printer. If your printer requires a baud rate other than 2400, Line 5 must be adjusted. The following printer controls are used:

`CHR$(15)` — underline on
`CHR$(14)` — underline off
`CHR$(27);CHR$(19)` — normal print
`CHR$(27);CHR$(20)` — condensed print
`CHR$(27);CHR$(14)` — elongated on
`CHR$(27);CHR$(15)` — elongated off
`CHR$(12)` — form feed
`CHR$(124)` — print divider

When you run the program, you are asked to input the number of forms you want printed. The forms are then printed and you can start your bookkeeping.

The Listing: `JOURNAL`

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 'JOURNAL
2 'KATHY RUMPEL
3 'ROUTE 1 BOX 67-A
4 'ARCADIA, WI  54612
5 POKE 150,18 '2400 BAUD
6 CLEAR 500
7 CLS:PRINT@74,"**JOURNAL**":PRI
NT@229,"NUMBER OF FORMS: ";:INPU
TNF:FOR TI=1 TO NF:PRINT@394,"FO
RM: ";TI
8 S1$=STRING$(10," "):S2$=STRING
$(30," "):S3$=STRING$(3," "):NU$
="##"
9 FOR P=1 TO 3:PRINT#-2:NEXT P
10 PRINT#-2,CHR$(15);
11 PRINT#-2,CHR$(27);CHR$(14);:P
RINT#-2,TAB(19);"JOURNAL";:PRINT
#-2,CHR$(27);CHR$(15);:PRINT#-2,
CHR$(27);CHR$(20);:PRINT#-2,TAB(
70);"PAGE:       "
12 PRINT#-2,CHR$(27);CHR$(19);:P
RINT#-2:GOSUB21
13 PRINT#-2," ";:GOSUB27:PRINT#-
2,S1$;:GOSUB27:PRINT#-2,S2$;:GOS
UB27:PRINT#-2,S3$;:GOSUB27:PRINT
#-2,S1$+S3$+" ";:GOSUB27:PRINT#-
2,S1$+S3$+" ";:GOSUB27:PRINT#-2
14 PRINT#-2,CHR$(15);:PRINT#-2,"
 ";:GOSUB27:PRINT#-2,"   DATE"+S
3$;:GOSUB27:PRINT#-2,TAB(23);"DE
SCRIPTION"+S1$;:GOSUB27
15 PRINT#-2,"REF";:GOSUB27:PRINT
#-2,"    DEBIT    ";:GOSUB27:PR
INT#-2,"    CREDIT   ";:GOSUB27
:PRINT#-2,CHR$(14)
16 FOR Y=1TO26
17 PRINT#-2," "+CHR$(124);:GOSUB
29
18 GOSUB 32
19 NEXT Y
20 PRINT#-2,CHR$(12);:NEXT TI:CL
S:END
21 'PRINT LINE
22 ST$=STRING$(78," ")
23 PRINT#-2,CHR$(15);
24 PRINT#-2,ST$
25 PRINT#-2,CHR$(14);
26 RETURN
27 'PRINT DIVIDER
28 PRINT#-2,CHR$(124);:RETURN
29 'LINE 1
30 PRINT#-2,S1$;:GOSUB27:PRINT#-
2,S2$;:GOSUB27:PRINT#-2,S3$;:GOS
UB27:PRINT#-2,S1$;:GOSUB27:PRINT
#-2,S3$;:GOSUB27:PRINT#-2,S1$;:G
OSUB27:PRINT#-2,S3$;:GOSUB27:PRI
NT#-2
31 RETURN
32 'LINE 2
33 PRINT#-2,CHR$(15);:PRINT#-2,U
SING NU$;Y;
34 GOSUB 29:PRINT#-2,CHR$(14);
35 RETURN
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one screen sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

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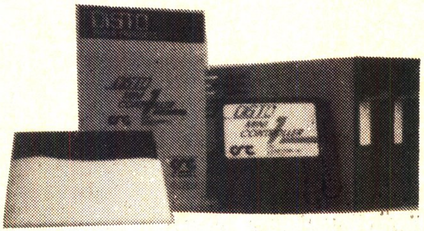

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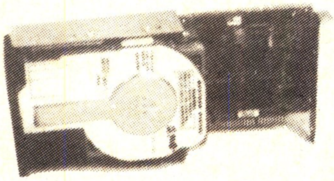

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High Hopes for the Hi-Res

by William Barden, Jr.
Contributing Editor

I covered ways of converting real-world inputs, such as temperature and light intensity, to a form the Color Computer can measure, in the May '89 issue of THE RAINBOW. The scheme is fairly simple: Unplug one of your CoCo joysticks and substitute a device such as a thermistor for the joystick.

Thermistors and other devices look like joysticks to the CoCo. The CoCo doesn't know whether it's reading an input representing an *x,y* position from a joystick or mouse or input for temperature or light intensity. Unfortunately the standard joystick software driver in CoCo ROM has one big drawback — it can only differentiate between 64 different voltage levels. This means that if you are using the joystick input to measure temperature, for example, you cannot have a range of more than 64 degrees if you want to measure in steps of one degree. It would be a lot more convenient to be able to measure over a range of -30 to +110 degrees Fahrenheit in 140 one-degree steps. Given the joystick limitations, how can this be done?

In this installment we'll take a look at the problem and investigate a ready-made $9.95 solution that requires no assembly or soldering. In the best case on the CoCo 3, you'll be able to measure about 700 increments, which is 10 times the resolution of the standard joystick port. In the worst case on a CoCo 1, you'll be able to measure about 300 increments. The solution is at your corner Radio Shack store, and (in case you haven't guessed) it's known as the High-Resolution Joystick Interface (Hi-Res Interface for short).

Basic Joystick

Whether you're using a joystick or color mouse, the operation on the CoCo is the same. Moving the joystick or mouse changes two electrical devices called *potentiometers*, or variable resistors. One potentiometer (*pot*) is linked to movement in the *x* direction, and the second potentiometer is linked to movement in the *y* direction, as shown in Figure 1. Each potentiometer is a 100K-ohm pot. The resistance of the pot changes from 0 to 100K ohms as the joystick is moved.

An ohm is a unit of resistance just as a volt is a unit of electrical force, and an ampere (or amp) is a unit of electrical current. Think of a volt as water pressure in a hose and an amp as the water current flowing in the hose. Electrical resistance is similar to the resistance of a small diameter hose versus a larger diameter hose. A gar-

Bill Barden has written 35 books and hundreds of magazine articles about small computers . His newest Color Computer book is "Connecting the CoCo to the Real World", a book of CoCo interfacing projects. He has over 20 years experience in the industry on systems ranging from mainframes to micros.

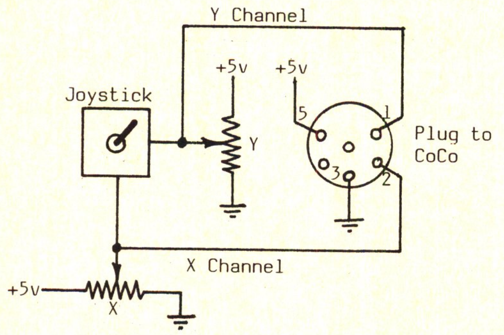
Y Channel
+5v
+5v
Joystick
Y
5
1
3
2
Plug to CoCo
X Channel
+5v
X

Figure 1

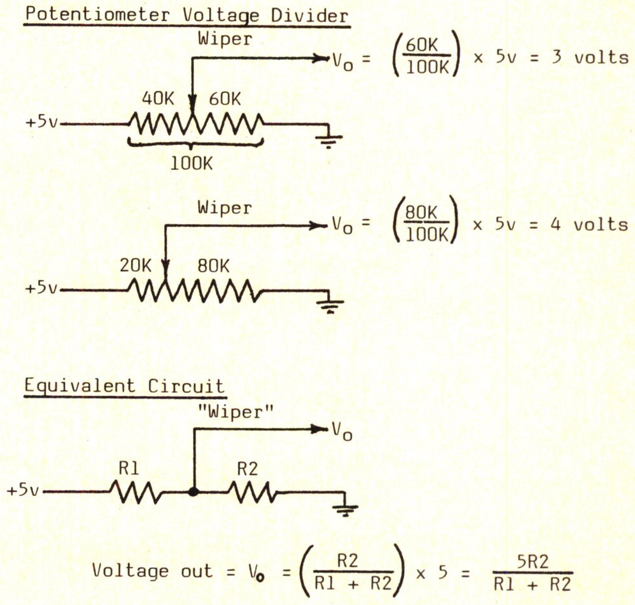
Potentiometer Voltage Divider
Wiper
$V_o = \left(\frac{60K}{100K}\right) \times 5v = 3$ volts
40K
60K
+5v
100K
Wiper
$V_o = \left(\frac{80K}{100K}\right) \times 5v = 4$ volts
20K
80K
+5v
Equivalent Circuit
"Wiper"
V_o
R1
R2
+5v
Voltage out = $V_o = \left(\frac{R2}{R1 + R2}\right) \times 5 = \frac{5R2}{R1 + R2}$

Figure 2

den hose has more resistance to water flow than a fire hose, for example. With the same water pressure (voltage), more water (current) flows through the fire hose within a given time than in the garden hose. Some materials (conductors) such as copper offer very little resistance to the flow of electrical current. Other materials such as carbon offer more resistance to the flow of current. Still other materials (insulators) such as glass allow almost no current to flow.

The pot in a joystick has a *wiper* that slides across the carbon or wire of the pot. The wiper forms a *voltage divider* to form two resistors. When voltage is put across the pot, the total voltage is divided into two parts, as shown in Figure 2. It's this voltage that the joystick circuitry in the CoCo measures, not really resistance. The voltage varies from about 0 to 5 volts, depending upon the position of the wiper.

A thermistor's resistance changes with changes in temperature. A cadmium sulfide photocell's resistance changes with light intensity. If you substitute a thermistor or photocell in place of one side of the pot and a fixed resistor for the other side, you have a circuit equivalent to the joystick pot, as shown in Figure 9. The voltage at the junction point changes as the resistance of the thermistor or photocell changes, and this voltage can be measured by the CoCo. Actually, *any* device that provides a variable voltage can be used with the joystick input. Up to 7,000 samples per second can be taken with a special joystick software driver, and it's even possible to measure and digitize voice or sound inputs from an amplifier, which is really just a series of rapid voltage changes.

The joystick circuitry of the CoCo contains a programmable device known as a *digital-to-analog converter* or DAC. If you feed in a digital value, out comes an analog voltage. There are six bits that make up the digital value, with 64 values from 000000 through 111111. The joystick position is actually read with a device called a *comparator* that compares one input voltage (from the joystick *x* or *y* pot) with a reference voltage from the DAC. This is shown in Figure 3. The DAC is rapidly programmed through a series of steps until a voltage is found that matches the joystick input. However, since the DAC allows only 64 voltage values, the *resolution* of the joystick circuitry is only one part in 64. This is fine for coarse resolution on a 128-by-192 screen of the CoCo 1 or 2, but not that great for the 640-by-192 screen resolution of the CoCo 3.

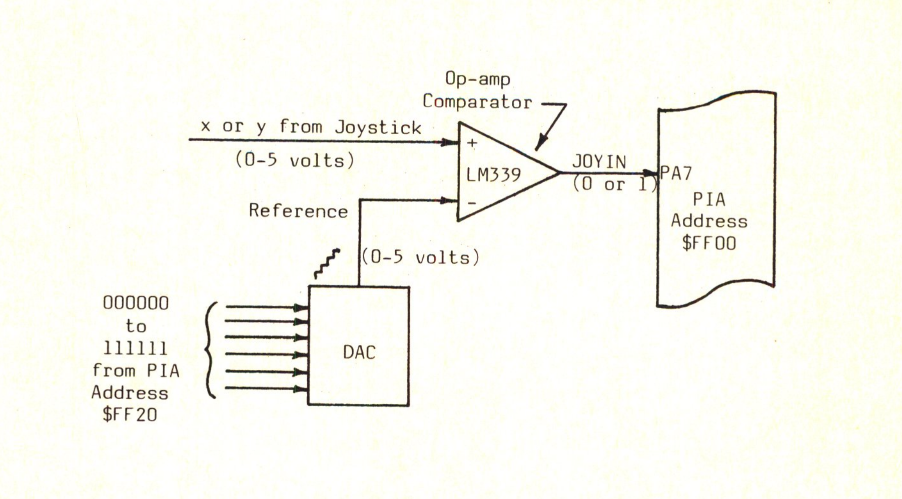

Figure 3

Enter the Hi-Res Joystick Interface

It was probably the CoCo 3's 640-by-192 screen that prompted Radio Shack to have the High-Resolution Joystick Interface developed. It's impossible to pinpoint more than 30 pixels (10 pixels by three pixels) on the Hi-Res screen at one time with the old joystick circuitry.

The joystick interface allows much finer resolution than the old joystick circuitry. With it you can pinpoint at least any two pixels on the 640-by-192 screen (two pixels by one pixel) and, if you have a precision joystick, even down to one pixel. At $9.95, it's a Color Computer bargain. Although designed for the CoCo 3, you can use it on the CoCo 1 and 2, especially for the purposes already mentioned.

William Barden Jr.
Color Computer Books

You know me from **Barden's Buffer** in **Rainbow** and from Radio Shack's **Color Computer Assembly Language Programming, Color Computer Graphics, and Color Computer and MC-10 Programs** books. I love the CoCo so much that I have two new books I think you'll enjoy.

Connecting the CoCo to the Real World

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How the Hi-Res Joystick Interface Works

I have two High-Resolution Joystick Interfaces but really hadn't investigated how they worked before this column. Unscrewing the black box of the joystick interface uncovers a small printed circuit board containing one integrated circuit and several other parts (see Figure 4). Using some of my integrated circuit reference manuals, I did some reverse engineering and came up with the circuit diagram shown in Figure 5.

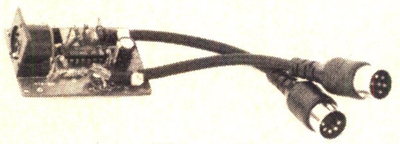

Figure 4

Circuit Diagram

The main IC here is a quad op-amp called the LM3900. The quad designation simply means there are four identical circuits in one chip. Op-amps are devices used for a variety of things. One use is as a comparator while another is as a waveform generator. Both applications are used here.

The joystick interface has two cables. One cable plugs into the right joystick port of the CoCo while the other cable plugs into the cassette port. A joystick plugs into the High-Resolution Joystick Interface rather than the CoCo.

Two lines from the joystick are button switches. (Some joysticks have only one button switch, and the CoCo 1 and 2 have only one button switch input.) These lines are fed straight through from the Hi-Res interface joystick input to the CoCo joystick port. Two of the other lines are +5 volts and ground from the CoCo joystick port. The +5 volts is used to power the circuitry of the Hi-Res interface. The other two lines are the *x* and *y* inputs from the joystick. The two voltages are converted by the interface to a timing signal by the Hi-Res circuitry and fed back to the CoCo.

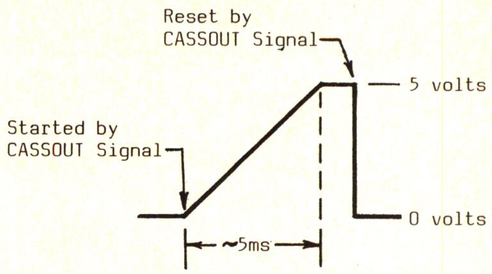

Figure 6

There are two lines from the CoCo cassette port that go to the Hi-Res circuitry, ground and CASSOUT. CASSOUT is normally used to send a sine wave to an external cassette recorder to record data. Here, though, CASSOUT has a much simpler function. It starts a timing count and is simply an on and off signal like a switch.

How the Interface Works

In essence here's how the Hi-Res interface works: Assume you've moved the joystick to a certain position. The *x* and *y* inputs are voltages between 0 and +5 volts. For example, the *x* input could be one volt (one-fifth of the distance to the right from the extreme left position), and the *y* input could be four volts (four-fifths of the distance from the extreme top position). Let's consider only the *x* voltage to make things easier. The *x* voltage from the joystick goes into one of the inputs of an op-amp comparator. The other input to the comparator is from ramp circuitry in the interface, described in a moment.

A special high-resolution joystick driver program starts the read of the input by turning on the CASSOUT signal from the cassette port. This signal acts like a switch to the Hi-Res interface. It starts a ramp voltage as shown in Figure 6. The ramp voltage increases as shown, building from 0 volts to +5 volts.

This ramp voltage is compared to the *x* input voltage by the op-amp comparator. As soon as the ramp voltage builds to 1 volt, the comparator output switches on. The comparator output goes to the *x* input of the right joystick port on the CoCo where it can be detected. The driver program counts the time, from the moment it turned on the CASSOUT signal to start the ramp, to the time the *x* comparator signals that the ramp voltage equals the *x* input voltage. This timing count varies from about 1 to 700 and is a measure of the joystick *x* position.

The same procedure is followed for the *y* input. Either *x* or *y* can be measured with

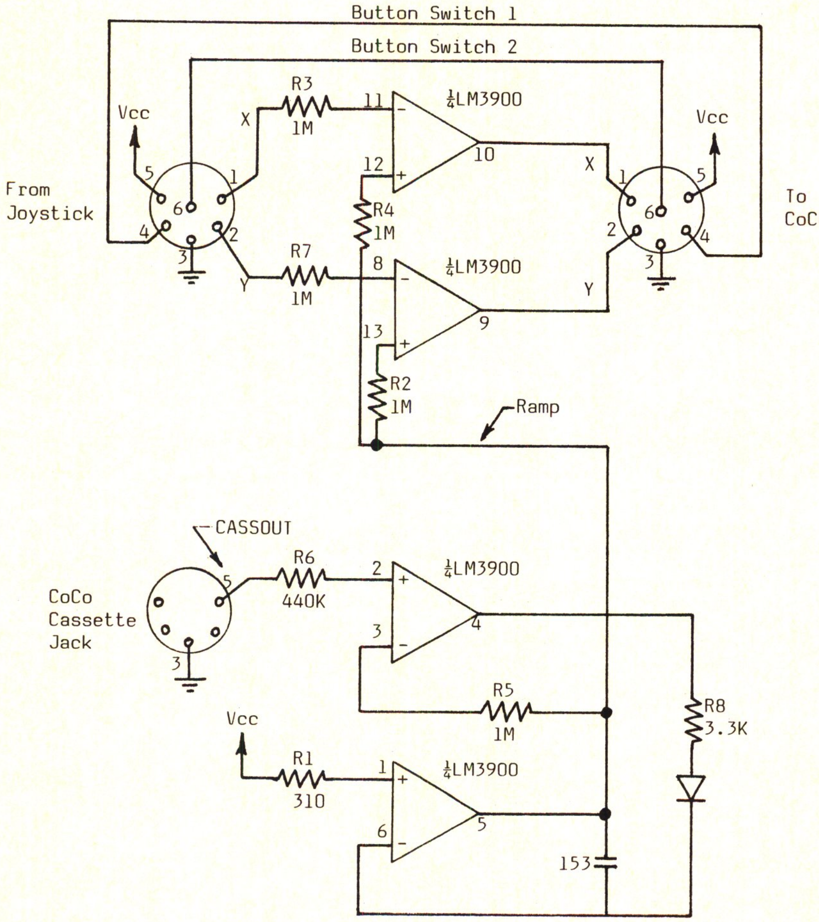

Figure 5

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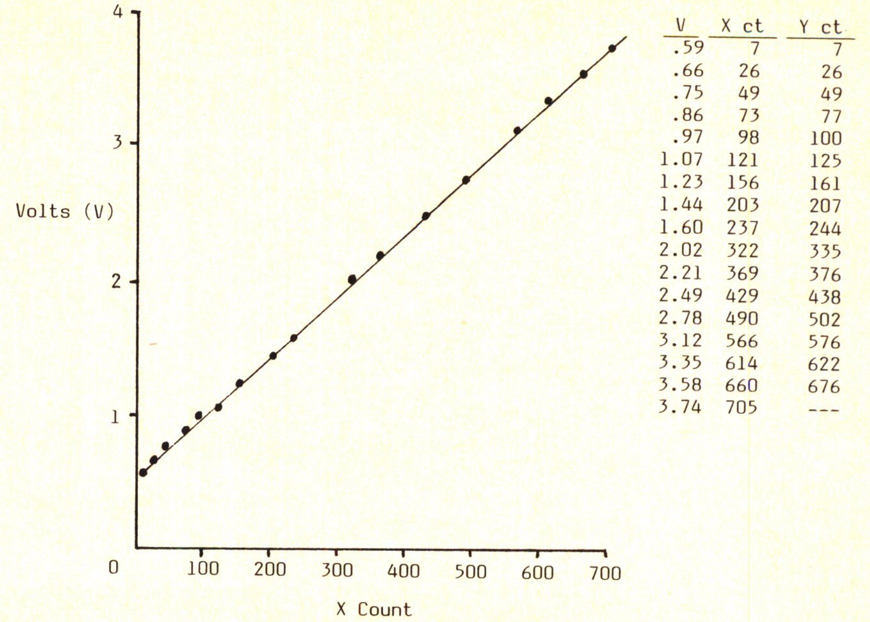
each pass through the program; hence it takes two ramps and compares to measure both *x* and *y*.



V	X ct	Y ct
.59	7	7
.66	26	26
.75	49	49
.86	73	77
.97	98	100
1.07	121	125
1.23	156	161
1.44	203	207
1.60	237	244
2.02	322	335
2.21	369	376
2.49	429	438
2.78	490	502
3.12	566	576
3.35	614	622
3.58	660	676
3.74	705	---

Figure 8

Hi-Res Software Drivers

The circuit components in the Hi-Res interface have been chosen by the design engineer at Radio Shack to create a ramp that takes about five milliseconds (1/200 second) to go from 0 volts to +5 volts. (I dusted off my trusty oscilloscope to actually see the ramp to verify this.) This means that any software driver must be in assembly language — BASIC is just too slow to detect an event that occurs every 1/200th of a second or less.

How does the software driver work? This took some digging. First, I scoped out the ramp voltage used in the *Color Computer Artist*, a graphics program by Steve Bjork that uses the Hi-Res interface. This program does two ramp comparisons, terminating the first directly after the *x* input has been found as shown in Figure 7.

However, the joystick driver code for the *Color Computer Artist* isn't as easily accessible for reverse engineering as the hardware. Besides, everyone knows that it's against federal law to find out how things work in software . . . .

In the course of a conversation with Cray Augsburg, however, I found out that an article on the Hi-Res interface already existed. "Programming the Hi-Res Joystick Interface," by Duane M. Perkins was in the February '88 issue of THE RAINBOW. My slimmed-down, modified result is the assembly language program in Listing 1. Listing 2 shows a BASIC version.

How the Assembly Program Works

My assembly language program is all relocatable code. Although specified at $7F00 (midway into the 64K bytes available on a CoCo 1 or 2, or into the 64K segment used by BASIC in the CoCo 3), it can be moved anywhere in memory and still work. The program is called by a `USR0(n)` call where *n* is 0 for the *x* input or 8 for the *y* input. The program returns a count of 1 to about 700 when used with a CoCo in high-speed mode and a count of about 1 to 300 when used in normal speed. The count represents a voltage input (normally this is a joystick *x* or *y* position, but in this case we're not using it for a joystick function).

The code first calls a ROM routine at $B3ED. This routine converts the floating-point number in the `USR0` parameter (0 or 8) to an integer value in the D register. Since this will be either 0 or 8 and can be held in eight bits, there will be a 0 in A and a 0 or 8 in B. This 0 or 8 value is stored in `PARAM` and used to select either the *x* or *y* input for the CoCo joystick port (by `STA` instructions to $FF01 and $FF03).

The `BSR RAMP` calls the `RAMP` subroutine in the code, which returns a value in the X register of 1 to about 700. After a return the `TFR X,D` transfers the count to the D register (A and B combined), and a `JSR $B4F4` returns the count value as a BASIC parameter (such as X in `X=USR0(0)`).

The `RAMP` subroutine first turns off the CASSOUT (by `STA $FF20`). It then loops for 256 counts, an arbitrary time, while the circuitry stabilizes. A second output to $FF20 turns on CASSOUT and starts the ramp. After a delay of 148 counts, the comparator output is continually read. (The 148 counts represents an initial voltage offset that must be ignored.) For each read, a count in X is incremented by one. When the ramp voltage reaches the input voltage (*x* or *y*), the count is returned in X.

The BASIC Program

The assembly language listing is for reference only. The machine code from this listing is also contained within the BASIC program and is moved from data statements to memory before execution. The BASIC program is simple. It calls the assembly language `READHI` routine repeatedly, returning an *x* and *y* value displayed on the screen center.

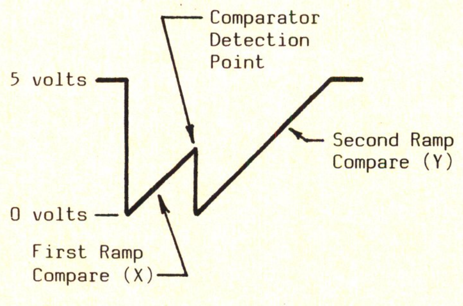
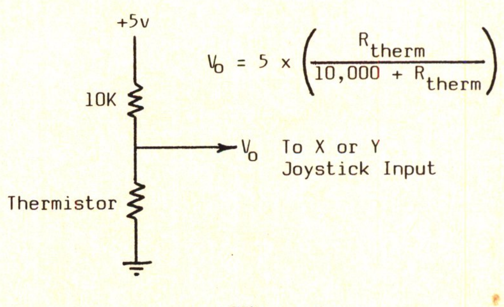


Figure 7



$$V_o = 5 \times \left(\frac{R_{therm}}{10{,}000 + R_{therm}} \right)$$

Figure 9

What Do You Do With It?

One thing this program is *not* designed for is to read the Hi-Res joysticks! You can use it for this if you want, but I recommend the Perkins program because it returns only values of 0 to 639 for *x* and 0 to 191 for *y*. My version returns values of 1 through about 700 for both *x* and *y*, increasing the resolution for real-world inputs. My version has no checks for false readings, as does Perkins' program. Potentiometer inputs may have problems with the wiper bouncing up and down on the pot, causing false readings. Real world inputs, however, are usually not electro-mechanical and should experience fewer false input values.

A few cautions about using the software: Use `POKE &HFFD9,0` on the CoCo 3 to speed up the MPU clock and get the full count range. Use `USR0(0)` or `USR0(8)` with no arguments other than 0 and 8; other arguments will not select *x* or *y* inputs. Interrupts are disabled by the routine; this should pose no problem for most programs. Do not exceed 3.75 volts for either the *x* or *y* inputs. Input voltages over this limit cause the program to seemingly lock up (actually the program is looping, waiting for a ramp comparison that can never occur; the same problem is present in Perkins' code).

Temp (°C)	Temp (°F)	Resistance
-50	-58	329,200
-45	-49	247,500
-40	-40	188,400
-35	-31	144,000
-30	-22	111,300
-25	-13	86,390
-20	-4	67,740
-15	5	53,390
-10	14	42,450
-5	23	33,890
0	32	27,280
5	41	22,050
10	50	17,960
15	59	14,680
20	68	12,090
25	76	10,000
30	85	8,313
35	94	6,941
40	103	5,828
45	112	4,912
50	121	4,161
55	130	3,537
60	139	3,021
65	148	2,589
70	157	2,229

Table 1: Temperature vs. Resistance

To test the linearity of the interface and program, I carefully input 17 different voltages on both *x* and *y*. If the interface is linear, the plot of input voltage versus output count is a straight line. The plot I obtained for the CoCo 3 in high-speed mode is shown in Figure 8, fairly close to a straight line. Note that the counts for *x* and *y* do not match exactly, differing by about two percent in some cases. This is probably due to tolerances of the components used in the interface.

For many applications, you can simply read the count and use a simple equation to obtain the real-world value. Suppose you are using the Hi-Res interface on the CoCo 3 to monitor a power supply that outputs voltages of 1 to 3.5 volts. The rate of change would be:

$$((3.58 - .66) / (660 - 26)) \\ = .0046057 \text{ volts per count}$$

The actual voltage measured would be:

COUNT * .0046057 +.57

(The .57 value is the voltage at which the

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count is 0.) For example, a COUNT of 369 would be:

369 * .0046057 + .57 = 2.26 volts

This corresponds to an error of about .05 volts against an expected value of 2.21 volts, an error of about two percent.

Temp (°F)	Resistance	Voltage	Count
32	27,280	3.65	669
41	22,050	3.43	621
50	17,960	3.30	593
59	14,680	2.97	521
68	12,090	2.74	471
76	10,000	2.5	419
85	8,313	2.27	369
94	6,941	2.05	321
103	5,828	1.84	276
112	4,912	1.65	234

Table 2: Count Values for CoCo 3

A Temperature Application

For other applications you may need to do a table lookup of count values versus their real-world analogs. Here's an example: Radio Shack carries a *thermistor*, a simple $1.99 device that changes resistance value with temperature (Part No. 271-110). This thermistor is about the size of the tip of a pencil and can be used to measure inside or outside temperature. The specs for this part are printed on the back of the package and are reproduced in Table 1.

Suppose we want to measure temperatures inside a house, which can range from freezing to 112 degrees Fahrenheit. The range of resistances is from about 27K ohms to 5K ohms. (By the way, in electronics nomenclature a K is 1000 and not 1024). The circuit is shown in Figure 9. It consists of a single fixed 10K-ohm resistor (Radio Shack Part No. 271-1335) and the thermistor connected between ground and the +5 volts from the Hi-Res interface connector. A wire from the junction of the two parts goes to the *x* (or *y*) input of the connector. The voltage input depends only upon the resistance of the thermistor as the 10K resistance is fixed. The count values for a CoCo 3 in high-speed mode at different temperatures are shown in Table 2.

Unfortunately the plot of temperature versus count, shown in Figure 10, is *not* linear for the thermistor circuit. This means you'll have to compare each count with a corresponding temperature. You can do this with only the 10 values above by *interpolation* with some loss of accuracy. For example, if the count is 400, the temperature estimate is 19/(419-369) = 19/50ths of the temperature difference between 85 and 76. This works out to .38*9=3.42, so the temperature for a count of 400 would be 76+3.42=79.42 degrees. From the plot in Figure 10, the actual temperature is very close to that value — much less than one degree of error. Contrast that value with an error of about three degrees with the low-resolution joystick scheme.

This thermistor application is just one example of the use of the Hi-Res joystick interface. Any CoCo hacker worth his salt can find several dozen more. Don't forget that each Hi-Res interface provides *two* inputs. A clever experimenter can even gang two Hi-Res interfaces together with parallel input from the cassette port and output going to the right and left joystick inputs of the CoCo to obtain four high-resolution inputs.

A New Book Along These Lines

If you are interested in real-world applications, I have a new book about how to use the CoCo 1, 2 or 3 for measuring real-world events. *Connecting the CoCo to the Real World* is a 192-page book available from me for $19.95. Among the several topics covered are:

- Speech and sound capture (up to 70 seconds worth)
- Sound and voice playback
- Telephone dialing
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- Temperature sensing
- Barometric pressure sensing
- High-speed tachometer
- Reading switches
- Measuring light intensity
- Detecting liquid levels
- A general-purpose CoCo interface board

All these things can be done inexpensively, usually for only a few dollars and a minimum of parts. For each of the two dozen or so applications, I've included complete hardware specifications and software drivers. Even CoCo users with no hardware experience should find many of the applications easy going.

See you next month with more CoCo topics. ❏

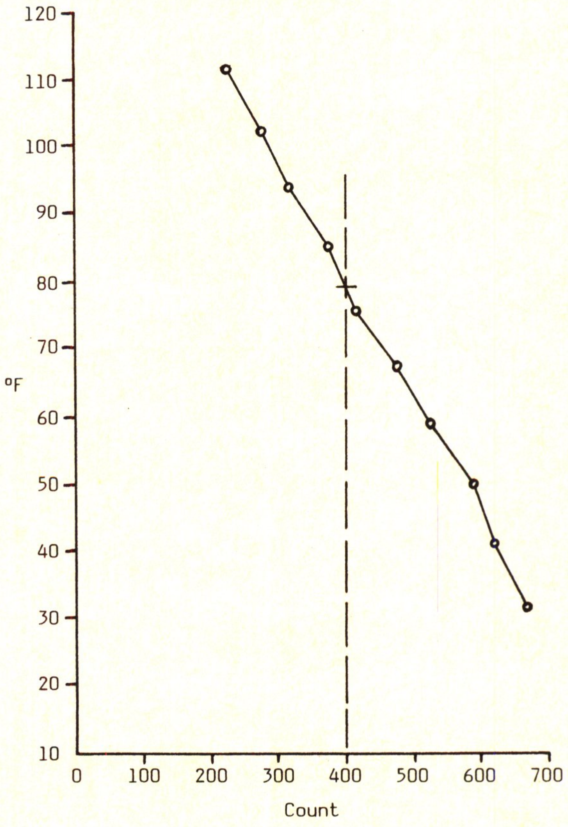

Figure 10

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CoCo 3

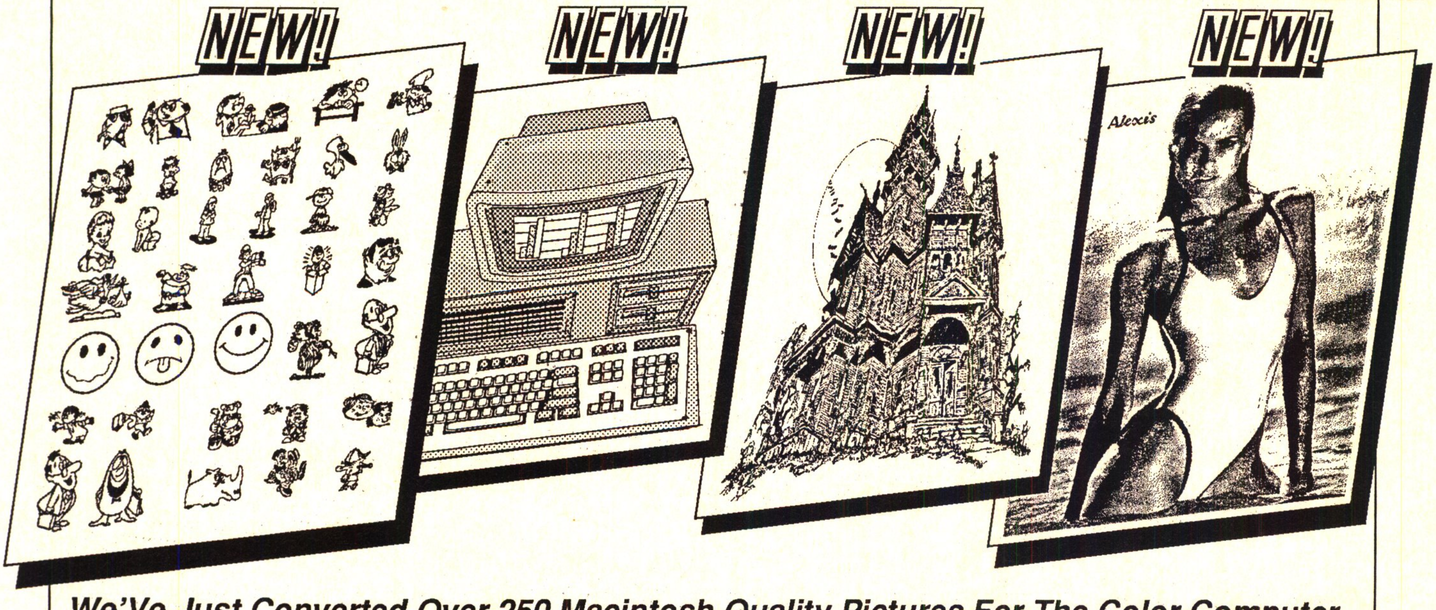
Listing 1:

```
00100          ORG     $7F00
00110 READHI   JSR     $B3ED        convert to integer
00120          STB     PARAM,PCR    save argument
00130          LDA     $FF01        select MUX 1
00140          ANDA    #$F7
00150          ORA     PARAM,PCR    merge in X or Y
00160          STA     $FF01
00170          LDA     $FF03        select MUX 2
00180          ANDA    #$F7
00190          STA     $FF03
00200          BSR     RAMP         get input count
00210          TFR     X,D          count in X to D
00220          JSR     $B4F4        reconvert for BASIC
00230          RTS                  return
00240 RAMP     LDA     $FF20        read count subroutine
00250          ANDA    #3
00260          ORA     #252
00270          STA     $FF20        turn off ramp
00280          CLRB
00290 LOOP1    DECB                 loop here for settling
00300          BNE     LOOP1
00310          LDX     #148         bypass offset
00320          ANDA    #$23
00330          STA     $FF20        start ramp
00340 LOOP2    LEAX    -1,X         loop here for 148 counts
00350          BNE     LOOP2
00360 LOOP3    LEAX    1,X          loop until compare
00370          LDA     $FF00        test comparator bit
00380          BPL     LOOP3
00390          RTS                  return
00400 PARAM    RMB     1            temp storage
00410          END     READHI
```

CoCo 3

Listing 2: `READHI`

```
100 ' HIGH-RESOLUTION JOYSTICK I
NTERFACE FOR REAL-WORLD INPUTS
110 POKE &HFFD9,0
120 CLEAR 200,&H7EFF
130 CLS
140 FOR A=&H7F00 TO &H7F42
150 READ H$: POKE A,VAL("&H"+H$)
160 NEXT A
170 DEF USR0=&H7F00
180 GOSUB 210
190 IF (PEEK(&HFF00)AND1)>0 THEN
 180
200 GOTO 180
210 X=USR0(0):Y=USR0(8)
220 IF X=LX AND Y=LY THEN CLS: P
RINT @230, X, Y
230 LX=X: LY=Y
240 RETURN
250 DATA BD,B3,ED,E7,8C,3D,B6,FF
,01,84,F7,AA,8C,35,B7,FF
260 DATA 01,B6,FF,03,84,F7,B7,FF
,03,8D,06,1F,10,BD,B4,F4,39,B6
270 DATA FF,20,84,03,8A,FC,B7,FF
,20,5F,5A,26,FD,8E,00,94
280 DATA 84,23,B7,FF,20,30,1F,26
,FC,30,01,B6,FF,00,2A,F9
290 DATA 39
```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Why not another maze game?

A Newfangled Maze

by Steve Ostrom

What? Not another maze game! Mazes are as old as anyone can remember. What else can be done with mazes that hasn't been tried before? Sure, there are the regular old mazes where you need to go from start to finish. There are invisible mazes where you need to feel your way through. There are 3-D mazes that give you the impression you are walking down corridors and passing through doorways. Even the ever-popular Adventure games have mazes at the core of their programs. So what is left to try?

Mazeway goes back to the simple maze idea but adds a special twist. When the program is run, you see a simple-looking maze form on the screen. There is an S for start and an F for finish. But you also see some numbers placed at seemingly random locations throughout the maze. These numbers, innocent-looking as they are, should cause you some concern.

You move the colored square through the maze by pressing the appropriate arrow keys. Your object is to go from start to finish in the least number of moves. The catch is that you must pass over the numbers in proper order: 1 to 2 to 3 to 4 and back to 1 again.

The program does not allow you to back up or move off the path. It also does not allow you to move across a number that is not in the right sequence. You do not need to pass over all the numbers. If you trap yourself with no allowable way to go, just press BREAK and run again.

Don't become too frustrated — there is a solution. (The solution is printed on Page 98 of this issue of THE RAINBOW for those who cannot find it themselves by playing the game.) It might help you to solve this maze by mentally working backward from the finish a few steps.

The program as written allows you only so many moves and displays each move you make on the screen. By deleting Line 46, you are given an unlimited number of moves to play with the maze, but your moves are not displayed. Either way you decide to play the game, it is an exciting challenge. ❑

16K Extended

18	9
33	114
49	87
66	238
73	173
80	15
END	124

The Listing: `MAZEWAY`

```
0 'COPYRIGHT 1989, FALSOFT INC.
1 'MAZEWAY
2 'STEVE OSTROM
3 '12612 CEDAR LAKE ROAD
4 'MINNETONKA, MN  55343
5 '612-546-7608
6 '
7 'RAINBOW
8 'JULY 10, 1989
9 '
10 CLS3
11 FORY=&H400 TO &H5C0 STEP32
12 W=0:FORX=0TO16
13 READZ:W=W+Z
14 POKEY+X,Z
15 NEXTX:READZ:IFW<>Z THEN17
16 NEXTY:GOTO20
17 CLS:PRINT"ERROR IN DATA LINE
#";(Y-320)/32+1
18 PRINT"CHECK EACH DATA LINE CL
OSELY.   MAKE SURE EACH LINE HAS
 18      ENTRIES. MAKE SURE THE
ONLY     NUMBERS USED ARE:
         49,50,51,52,70,83,128,1
```

Steve Ostrom has been programming for 22 years. He has written and published utilities, games and tutorials for the Color Computer. He may be contacted at 12612 Cedar Lake Road, Minnetonka, MN 55343. Please enclose an SASE when requesting a reply.

```
75       MAKE SURE THERE ARE 15
LINES OF DATA."
19 END
20 PRINT@19,"NEXT NUMBER";
21 D=1:V=52:C=128:L=&H420:X=114:
Y=-1:M=0:POKEL,191:PRINT@55,1;
22 A$=INKEY$:IFA$=""THEN22
23 IFA$=CHR$(94)THEN28
24 IFA$=CHR$(10)THEN48
25 IFA$=CHR$(8)THEN55
26 IFA$=CHR$(9)THEN61
27 GOTO36
28 IFD=1THEN36
29 IFL<&H420 THEN36
30 A=PEEK(L-32)
31 IFA=128THEND=0:GOTO39
32 IFA=V+1 THENV=V+1:D=0:GOTO37
33 IFA=49ANDV=52THENV=49:D=0:GOT
037
34 IFA=83THEN21
35 IFA=70THEN67
36 SOUND10,10:GOTO22
37 IFV=52THENV=48
38 PRINT@55,V-47;
39 POKEL,C:M=M+1
40 IFD=0THENB$="U":L=L-32:GOTO44
41 IFD=1THENB$="D":L=L+32:GOTO44
42 IFD=2THENB$="L":L=L-1:GOTO44
43 L=L+1:B$="R"
44 C=PEEK(L):Y=Y+1:IFY>13THENY=0
:X=X+32
45 IFX>510THEN83
46 PRINT@X+Y,B$;
47 POKEL,191:GOTO22
48 IFD=0THEN36
49 IFL>&H5C0 THEN36
50 A=PEEK(L+32)
51 IFA=128THEND=1:GOTO39
52 IFA=V+1 THENV=V+1:D=1:GOTO37
53 IFA=49ANDV=52THENV=49:D=1:GOT
037
54 GOTO34
55 IFD=3THEN36
56 A=PEEK(L-1)
57 IFA=128THEND=2:GOTO39
58 IFA=V+1 THENV=V+1:D=2:GOTO37
59 IFA=49ANDV=52THENV=49:D=2:GOT
037
60 GOTO34
61 IFD=2THEN36
62 A=PEEK(L+1)
63 IFA=128THEND=3:GOTO39
64 IFA=V+1 THENV=V+1:D=3:GOTO37
65 IFA=49ANDV=52THENV=49:D=3:GOT
037
66 GOTO34
67 CLS:PRINT"YOU ARE THE WINNER.
":PRINT:PRINT"IT TOOK YOU";M;" M
OVES":END
68 DATA83,175,128,128,128,128,12
8,128,50,128,128,128,128,128,128
,175,175,2194
69 DATA128,175,51,175,49,175,52,
175,175,175,51,175,128,175,50,17
5,175,2259
70 DATA128,49,128,52,128,49,128,
128,128,128,128,52,128,128,128,4
9,128,1787
71 DATA175,175,128,175,50,175,17
5,175,50,175,128,175,52,175,51,1
75,128,2337
72 DATA175,175,128,50,128,51,128
,49,128,175,49,175,128,128,128,1
75,70,2040
73 DATA175,175,51,175,128,175,12
8,175,128,175,128,175,51,175,50,
175,175,2414
74 DATA128,128,128,49,128,52,128
,52,128,49,128,175,128,128,128,1
75,175,2007
75 DATA128,175,52,175,51,175,175
,175,51,175,128,175,52,175,49,17
5,175,2261
76 DATA128,175,128,49,128,50,128
,128,128,128,128,51,128,128,128,
175,175,2083
77 DATA128,175,51,175,52,175,52,
175,51,175,50,175,52,175,50,175,
175,2061
78 DATA128,175,128,50,128,49,128
,128,128,50,128,51,128,128,128,1
75,175,2005
79 DATA128,175,175,175,175,175,1
75,175,175,175,175,175,51,175,17
5,175,2804
80 DATA128,175,175,175,128,128,1
28,128,128,128,128,128,128,175,1
75,175,175,2505
81 DATA128,175,175,175,49,175,50
,175,51,175,175,175,175,175,175,
175,175,2553
82 DATA128,128,128,128,128,128,1
28,128,128,175,175,175,175,175,1
75,175,175,2552
83 CLS:PRINT"TOO MANY MOVES":PRI
NT:PRINT"GAME OVER"
84 PRINT@480,"PRESS <ENTER> TO R
ESTART";:INPUTA$:RUN
```

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Working in Quadrants

by Joseph Kolar
Contributing Editor

One of the most interesting aspects of the `DRAW` statement is the A option. The graphics programmer can get a lot of mileage from the A option (so-called mode) because it allows a design element to be rotated around a point of origin in a 90-degree angular, clockwise rotation. The A option is particularily useful when it is used to set a design element in all four quadrants.

You will enjoy this tutorial so smack your lips, rub your hands in anticipation, and get out your graph paper and pencil.

Look at Listing 1, type in lines 10 and 15 unmasked (without a `REM` marker), and run the program. The screen is divided into four quadrants: In a clockwise direction, the one in the upper right-hand region is Quadrant 1 and the one in the lower right-hand region is Quadrant 2, etc.

We are going to create a box as a string variable `A$` that can be observed as it is put through its paces using the A option. To facilitate viewing the square and to keep it oriented properly, the opposite end from the point of origin has a small arrow that points to the point of origin.

The point of origin is of prime importance because each drawn element should end at this point. This is usually done by drawing one continuous line that ends where it begins in a closed circle.

Next type in Line 30. The `A0`, or default option, should be entered in the `DRAW` statement when the A option is to be used extensively. We plan to use `S16`, a size large enough to be seen clearly yet not overwhelming. Mask and unmask Line 15 whenever you deem it wise. Use your graph paper to draw the shapes and plot the locations where the elements will fall. Concatenation is used to display `A$` so add `+A$` to Line 30, then run the program. Notice that this element falls into the second quadrant. Depending on the direction taken from the point of origin, an element can fall in any quadrant or even straddle two adjoining quadrants as you will discover.

Moving in the direction CoCo dictates, the next element falls in Quadrant 3. Type in Line 31 and add `+A$`, then run the program. Using graph paper, do the same to lines 32 and 33. After you have placed `A0`, `A1`, `A2` and `A3`, notice that they are placed 90 degrees to the left of their predecessor so that a design of sorts is created.

Type `EDIT 20`, then press ENTER. Press the space bar until the cursor is under the `3`. Type `8 D` to zap the arrow, then press ENTER and run the program again.

For an odd tid-bit, in Line 30 delete 0 from `A0` and in Line 32 delete 2 from `A2`; then run the program. Restore lines 30 and 32 to the previous state. Add another `+A$` to Line 30, then run the program. Nothing? This is not quite true. The design element ended at the point of origin, thus the next element was superimposed on top of the first `A$`.

To verify going around a point, remove the redundant `+A$` from Line 30. In lines 31, 32 and 33, respectively, after `A1` insert `S12`; after `A2` insert `S8`; and after `A3` insert `S4`. Then run the program. As they are placed around the point, the elements become succesively smaller.

To go around the point counterclockwise, change Lines 30 through 33, respectively: `A0` to `A3`, `A1` to `A2`, `A2` to `A1`, `A3` to `A0`. Then run the program. The first element is in Quadrant 1. (It is not the small one in Quadrant 2.)

Restore lines 30 through 33 so the A options are `A0`, `A1`, `A2` and `A3`, respectively, leaving the sizes undisturbed. Now type in Line 21, noting that a continuous line is drawn that returns to the point of origin of the 6-by-4 rectangle. The corner furthest from the point of origin is marked. Change `A$` to `B$` in lines 30 through 33. Then run the program after each change to see the progression of the oblong as it is rotated around the point. They become successively smaller as they are added clockwise.

Remove the Size option in lines 31 through 33, then run the program. What would happen if we added `+A$` to four lines? To find out, add `+A$` to lines 30 through 33 and run the program. Again, since the ending point of `B$` was at 128, 96, `A$` begins there and we see the interesting effect.

Remove all concantenated variables from lines 30 through 33, then type in Line 22. At the end of Line 30, add `+C$` and run the program again. The element is in Quadrant 1 that we drew up from the point of origin. Add `+C$` one at a time to lines 31 through 33 to see the four shape locations unfold, clockwise as expected.

At this point we have drawn elements to the right and up from the point. If you care to reflect, suppose an element is drawn down or left from the point. In what quadrant would it fall? You have graph paper, so use it up!

In lines 30 through 33 concatenate `B$` at the end of `A$` and run the program. Effortlessly we create a simple but powerful design. You can also reverse `B$` with `C$` in Line 30, then run the program. It makes no difference because even though the two units have a common side, they cover two different areas.

Remove the concatenated variables from lines 30 through 33 and type in Line 24. Check it out on graph paper. The point of origin is at the middle of a side instead of in a corner. Add `+D$` to Line 30 and run the program. The corner marker is not relocated because it is impractical. (Imagine it pushed to the middle of the far side.) Now you can complete the design and check it.

Beginning with Line 30, add `+B$` at the end, through Line 33. Then add `+C$` to Line

---

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

30 and proceed through Line 33 to watch a design evolve as you stop to check after each addition.

Here is a challenge: Fill in the missing small marker boxes to make the design more coherent. As it stands, it looks like a grinning mouth with missing teeth. Remove all concatenated elements from lines 30 through 33. Type in Line 24 and add `+E$` to Line 30, then run the program. This element begins at 128,96 but runs off on a diagonal. Note the quadrant in which it is located, then take a few moments to design an element on graph paper that locates in the opposite quadrant. Add `+E$` to Line 31 and run the program. After completing the design, run the program again.

Now you are ready to clear the deck for action! Remove all `+E$` variables and type in Line 25. One at a time, display `+F$` until all four are displayed. When finished, you have a floor-tile design. Note that the diagonals in the Quadrant 2 element run in the opposite direction from the one in Quadrant 3. The object is to superimpose the `F$` design in Quadrant 3 on top of the one in Quadrant 2. Remove `+F$` from lines 32 and 33.

From the looks of it, it seems as if we must move the third quadrant design three units right (or `BR3`) because we want an invisible jump to a new location. After `A1` in Line 31, insert `BR3`. Then run the program. As you can see, it doesn't do the trick because we moved in the wrong direction. Jumping right dropped us down on the screen. Rather than throw up our hands in despair, we must go up three spaces, try `BU3`, and run the program.

What direction do you have to move to superimpose `A2` in Line 32 over `A3` in Line 33 in the first quadrant? Add `+F$` to lines 32 and 33 and insert `BU3` after `A3` in Line 33. Then run the program.

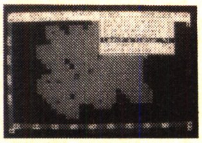
Here is a fun puzzle. Cross-hatch all four elements created with the ordinary `+F$` added to each cleared Line 30 through 33. Hint: One solution is given at the end.

Restore lines 30 through 33 to the original state as in Listing 1. To move the element in the first quadrant on top of the one in the second quadrant (in a counterclockwise direction to Line 30) add `+F$`. After `A3` in Line 33, add `BU3BL3BD3"+F$`. If you add the fourth direction, `BR3`, in the bargain, you will go full cycle. Try it!

I think you can figure out on graph paper that to superimpose `F$` in Quadrant 1, moving in a clockwise direction, Line 33 would read `33 DRAW"A3BL3"+F$`. Run the program and see.

From these two examples, can you figure out how to program the lines to superimpose `F$` in Quadrant 4 upon `F$` in Quadrant 2 in a clockwise direction? Clear lines 30 through 33 to appear as in Listing 1. It is interesting because quadrants 2 and 4 have the same design. To find out if you succeeded, insert `C0` in the appropriate line to blank out the over-printed element in Quadrant 2.

Clear lines 30 through 33 of debris so it



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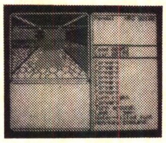
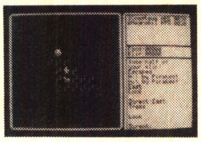
Price: $29 US / $34 Cdn.

Overlord requires: 128k CoCo 3, 1 drive and a mouse or joystick.





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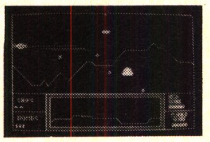

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Requires: 128k CoCo 3, 1 drive

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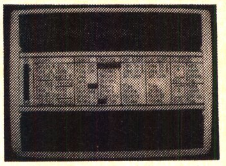

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Requires: 128k Coco3,drive, mouse/joystick

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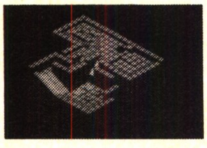

New! **Those Darn Marbles**

Dedicate a program to 512k machines only, and all sorts of new things are possible. Those darn Marbles is the first CoCo game to use the built-in hardware screen scrolling features of the CoCo 3. This means that all the computer's time cn be dedicated to controlling the game itself (sound effects, moving objects around, etcetera) rather than the time-intensive chore of scrolling an entire 32k screen around. You will be amazed to see how smoothly a HARDWARE-scrolled screen can move. Compare Those Darn Marbles with any other 3D marble type game on any computer, and you will be convinced that your CoCo 3 really can stand with the best of them. (One of our playtesters remarked, upon seeing the pre-release version of TDM: "My Amiga isn't that smooth!")

Not convinced? TDM is so chock-full of graphics that it comes on (count 'em) six discs!

It's been said many times, but this time it's true: Your CoCo 3 game library is not complete without a copy of Those Darn Marbles.

Price $32 US / $38 Cdn. Requires: 512k CoCo 3,1 drive,joystick.

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is the same as Listing 1. Next type in Line 26, add `+G$` to Line 30 and run the program. Where would you expect Line 31, `+G$`, to display its element? Try it and see! Now complete Line 32 through 33 and run the program. Let's mask Line 15. This design jumped two units in H direction before drawing a box. Unmasking Line 15 brings this design back to dead center (128, 96). It needs to be recentered only along the vertical axis in down or + direction. Two spaces multiplied by the size offset, (16/4) = +8. Add 96 + 8 = 104. Change 96 to 104 in Line 30 and run the program. With the cross hairs to guide, it is no big deal to ease it into the proper location using the trial-and-error method.

Restore lines 30 through 33 to their original state as in Listing 1, remembering to change 104 back to 96 in Line 30. Type in Line 27 and make sure Line 15 is operational. Add `+H$` to Line 30 and run the program. This element begins the box one unit in H direction from the point of origin. One by one, add `H$` to lines 31 through 33 and run the program. Mask Line 15 to get an unobstructed view — this pattern has an interwoven motif. Can you pick out the point of origin? If you peer carefully, you can distinguish four oblong shapes and the point is where they intersect. Change `S16` to `S32` in Line 30 and you won't have any trouble seeing it.

To get another interesting shape, add an extra `+A$` to the four lines, then run the program. The point has not moved. To see where the pairs were plotted, you need your trusty graph paper. As the design builds up, it gets quite confusing. If you want to center it vertically, (128, 112) will do it.

Clear lines 30 through 33 as in Listing 1, change `S32` back to `S16`, then unmask Line 15. Type in Line 28 and add `+I$` to Line 30, and run the program. Although the point is still at (128,96), a four-space jump or invisible line preceeds the box, which starts at the middle of the side and straddles quadrants 1 and 2. Add `+I$` to lines 31 through 33, then run the program. The squares do not end at the point of origin but at the left side of the square.

Without disturbing lines 30 through 33, type in Line 29. This is substantially the same as `I$` except that it ends at the point of origin, (128, 96). Add `+J$` to all four option lines and run the program, then delete all the `+J$` variables and run the program.

Beginning with Line 30, change all `I$` to `J$`, one at a time and run the program. Watch the blocks get pushed around until they make an orderly design. Restore lines 30 through 33 to their original state. Edit Line 20, then type in `29D` and press ENTER. This is the same as `J$`, except that the box ends with a jump four spaces to the right from the center of the right side. Plot this on graph paper. One at a time, add `+A$` to lines 30 through 33, then run the program. What could it be? Add a second `+A$` to Line 30 and run the program. One at a time, add the double `+A$` variables to lines 31 through 33 and run the program. Using trial and error, center the resultant rough circle of squares. A (-48,-48) movement gives you `BM80,48` in Line 30. Now run the program.

What would happen if we added another round of `+A$` variables? A bigger circle? Add the four `+A$` additions and run the program. If everything is equal, (-24,-24) should enter it. Add `BM56,24` in Line 30 and run the program. Now change `S16` to `S4` in Line 30 and run the program. It fits fairly well in the fourth quadrant but it looks odd. Dare we add another round of `+A$`s? Add one more `+A$` to lines 30 through 33 and run the program.

Add to the end of Line 20 `:Z$=A$+A$+A$+A$+A$+A$`. Clear lines 30 through 33 to be as in Listing 1. Add `+Z$` to each and run the program. If we tried to recenter and changed `BM56,24` to `BM128,96` in Line 30, we overshoot the landing field. We must find the difference between the two pairs of coordinates, split the difference, and add it to `BM56,24` to find the true center, or `BM92,60`. The formula is:

(128-56,96-24)=(72/2,72/2)=(+36,+36)
(56+36,24+36)=(92,60)

To change the numbered coordinates, `BM92,60`, to variables so we can use various values, Line 30 must be retyped to read:

```
30 DRAW"A0S4BM=X;,=Y;"+Z$
```

Now we can use the `DRAW` statement and change the *x,y* values. CoCo will allow this only if the coordinate variables are preceded by an equal sign, followed by a semicolon, and separated by a comma.

Insert at the beginning of Line 30:

```
FOR X=56 TO 128 STEP 36: FOR Y=2
4 TO 96 STEP 24:
```

These figures were gleaned from our centering calculations. Add Line 34 `NEXTY,X` to make a loop, mask Line 15, and run the program. I don't know what we got because one thing led to another. We did find out how to change coordinates inside a `DRAW` statement. It looks more colorful if Line 10 is changed to `SCREEN,1`.

You have just seen an example of how to create a great big nonstarter out of a little nothing. Unfortunately, some graphics are useless. But consider it as a vehicle to teach you just a bit more about graphics and to keep your interest at fever pitch. `CSAVE` a copy.

Type in `NEW` and then `CLOAD"LISTING1"`. Edit Line 20, type in `29D`, then press ENTER. Add to the end of Line 29:

```
:K$=A$+B$+C$+D$+E$+F$+G$+H$+I$+J$
```

Add `+K$` to lines 30 through 33, then run the program.

Recenter with the trial-and-error method. Change `BM128,96` to `BM94,76` in Line 30, mask Line 15, then run the program. Change Line 10 to read:

```
PMODE1:PCLS2:PMODE4:SCREEN4
```

Then run the program.

I call this *Condos Under Construction as Seen From Above*. Use the Reset button to toggle between color sets. Sometimes you get a bluish color; other times it's reddish.

Now you have been introduced to some potential uses of the potent A option. You must admit it is fun fooling with graphics.

A trial-and-error solution (by no means the only one) for the cross-hatching floor-tile problem is as follows:

```
30 DRAW"A0S16BM128,96"+F$+"A1"+F$
31 DRAW"A2BU3"+F$+"A3"+F$
32 DRAW"A0BR6BH6"+F$+"A1"+F$
33 DRAW"A2BU3"+F$+"A3"+F$
```

❑

16K Extended

The Listing: `AOPTION`

```
0 'LISTING1
5 CLEAR500
10 PMODE4,1:PCLS:SCREEN1,0
15 LINE(0,96)-(255,96),PSET:LINE
(128,0)-(128,191),PSET
20 A$="R6D6H3NDNRBF2RGNUNRL5U6"'
A$="BM+4,-2ND4R4D4L4BM+8,-2"
21 B$="R6D4HNDRGNRL5U4"
22 C$="U4R5NDRNDGRD3L6"
23 D$="U2R6D4HNDRGNRL5U2"
24 E$="U2E4RNDRNGDNHNLDG4L2"
25 F$="RGDE2RG3RE2DGRNU3L3U3NR3"
26 G$="BH2R4D4L4U4"
27 H$="BHR4D4L4U4"
28 I$="BR4U2R4D4L4U2"
29 J$="BM+4,-2R4D4L4U4BM-4,2"
30 DRAW"A0S16BM128,96"
31 DRAW"A1"
32 DRAW"A2"
33 DRAW"A3"
100 GOTO100
```

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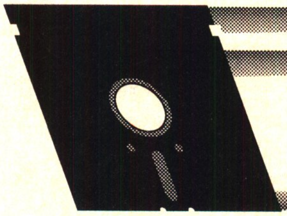
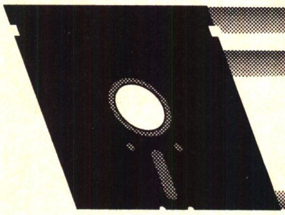


Drive With Speed



by Stephen B. Goldberg

Now you can make your OS-9 floppy drives work much faster. In fact, you can almost double the speed programs write to disk by turning off the disk write verification. OS-9 comes with verification enabled for all disk write operations. Each time you write to the disk, OS-9 goes back and reads the sector just written to verify the sector is not defective and wasting time. If your drives are in good working order and you use good-quality disks, this is not necessary. If you have a way to turn off the verification, your floppies will fly. This is where *Verify* comes into the picture.

Steve Goldberg is a dentist who enjoys programming on his son's CoCo. Steve can be contacted at 695 Plainview Rd., Bethpage, NY 11714. Please include an SASE when requesting a reply.

OS-9

The Listing: `vfy.c`

```
/*
* VFY  -  (c) 1989 by Stephen B. Goldberg
*
* Use: vfy
*      to see current verification mode
* Use: vfy on / vfy off
*      to set verification mode
*/
#include <ctype.h>

#define VFY 26         /* Offset to IT.VFY (verify byte) */
#define ON  0          /* Verify ON */
#define OFF 1          /* Verify OFF */
#define COUNT 5        /* Descriptor count, use 4 if /DD not a floppy */

main(argc,argv)
int argc;
char *argv[];
{
    static char *name[] = { "d0",   /* Descriptor names */
```

```
                                  "d1",
                                  "d2",
                                  "d3",
                                  "dd" }; /* Omit if /DD not a floppy */
    int i;
    char mode = OFF;

    if(!--argc) {                 /* Display the mode if no parameter */
        display(name[0]);
        exit(0);
    }

/* Check for correct syntax */
    for(i = 0; argv[1][i]; argv[1][i] = tolower(argv[1][i++]))
        ;
    if(!--argc && !strcmp(argv[1], "on"))
        mode = ON;
    else if(argc || strcmp(argv[1], "off")) {
        printf("%cUse: vfy [on/off]\n", 7);
        exit(0);
    }

/* Set new verification mode */
    for(i = 0; i < COUNT; setmode(mode,name[i++]))
        ;
    exit(0);
}

display(name)
char *name;
{
    char *addr;                        /* Module pointer */
```

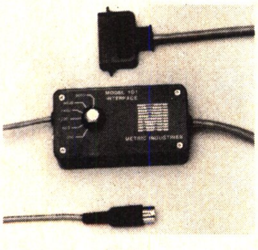
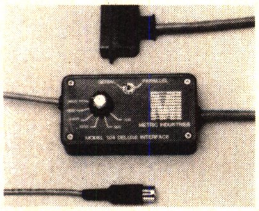
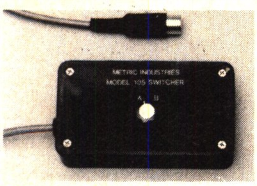
OS-9 gets much of the information on how to operate from its device descriptors. You have a device descriptor in memory for each floppy drive. Level II also has an additional descriptor, named `DD`, for the default drive. In an all-floppy system, Drive `/D0` and Drive `/DD` are the same drive.

The device driver (`CC3Disk` in Level II and `CCDisk` in Level I) reads the device descriptor before each disk operation is performed. The byte at Hex Offset $1A or Decimal 26 (`it.vfy`) in each floppy descriptor comes from Tandy set to zero. This tells the driver to use verification.

Verify is a utility that changes the Verify byte in all your floppy drive descriptors with one command. To disable the verification and speed disk operation use `OS9: vfy off` then press ENTER.

Any time you need verification (marginal-quality disks, very important data, etc.), type in `OS9: vfy on` and press ENTER.

You can include the `vfy off` command in your startup file if you want to run at top speed from the time you boot up. A better way is to issue the `vfy off` command and then use `cobbler` to resave your OS-9 boot

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file with the patched descriptors. *Verify* includes a routine that corrects the CRC bytes of all the descriptor modules so these load correctly in either mode (On or Off).

Verify has one more feature. If you want to know the current verification mode, use `OS-9:vfy`, press ENTER, and *Verify* lets you know.

You can use the source code for *Verify* exactly as listed, or you can omit those device descriptors not being used by your system. The program *Verify* operates correctly either way. If your CoCo uses the `/DD` device for something other than a floppy drive (hard disk or RAM disk), you must omit `/DD` from the program. If you omit `/DD` or any of the other descriptors, you must change the `COUNT` definition at the beginning of the listing to reflect the actual number of descriptors. ❑

```
    addr = modlink(name, 0, 0);   /* Link to descriptor */
    printf("\nVerify: ");         /* Display the mode */
    if(*(addr + VFY))
        printf("OFF\n");
    else
        printf("ON\n");

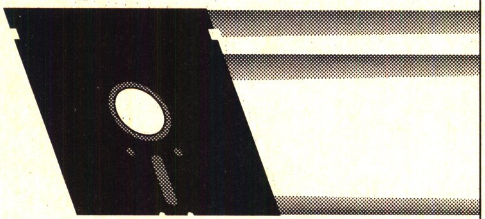
    munlink(addr);                /* Restore link count */
 }

setmode(mode,name)
char mode;
char *name;
{
    char *addr;                   /* Module pointer */
    char *crcadd;                 /* Pointer to CRC bytes */
    unsigned *length;             /* Pointer to module length */
    unsigned len;                 /* Module update length */

    addr = modlink(name, 0, 0);   /* Link to descriptor */
    if(addr == -1)                /* Return if not present */
        return ;
    *(addr + VFY) = mode;         /* Set verification mode */

    length = addr + 2;            /* Update CRC bytes */
    len = *length - 3;
    crcadd = addr + len;
    *crcadd = *(crcadd + 1) = *(crcadd + 2) = 255;
    crc(addr, len, crcadd);
    *crcadd++ = ~*crcadd;
    *crcadd++ = ~*crcadd;
    *crcadd = ~*crcadd;

    munlink(addr);                /* Restore link count */
}
```



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Disconnecting Call Waiting

by Marty Goodman
Contributing Editor

How can I disable Call Waiting before logging on to Delphi with my modem?

Edward G. Stroh
Thornton, Illinois

Many areas that offer Call Waiting service allow you to disable it by dialing *70 on your touch-tone phone, or 1170 on a rotary dial (pulse) phone. When you do this, you will hear a dual *bleep*, then a dial tone. You then dial your number. Call Waiting is disabled for that one phone call and is reinstated on your next call. Check with your operator or business office if you are uncertain about using this method in your area.

CM-8 for IBM CGA

Can I connect a CM-8 to an IBM CGA card?

Jim Prichard
St. Louis

Yes and no. If you hook the R to R, G to G, B to B, H sync to H sync, V sync to V sync, and ground to ground lines of a CGA card and a CM-8 monitor, you will likely get a creditable image. But the CM-8 has no provision for the intensity line of a CGA video output, and as a result you get only six possible colors plus black and white, as opposed to the 14 colors plus black and white that a true CGA monitor can display. Furthermore the CM-8's inputs were designed not for the 0- to 5-volt TTL signal levels that a CGA card produces, but for 0- to .9-volt analog signals. In theory, prolonged exposure to such CGA signal levels might damage the input chip on the CM-8. Unfortunately the resolution of a CM-8 is marginal for 80-column display, to the extent that I personally consider it unsuitable for prolonged text viewing. Of course it does a fine job of displaying 320-by-200 resolution graphics images.

What Has THOR Got in Store?

I've recently heard of a new type of erasable compact disc from Tandy called THOR. I've heard this drive can store 550 megabytes of data. Can it be hooked to a CoCo under OS-9? It seems to be better than a hard disk drive.

Brian Kuschak
Riegelsville, Pennsylvania

The THOR disc system is not yet ready for release. When it is released, you can in theory hook it (and nearly anything else) to a CoCo under OS-9, but you have to write drivers for it and probably use a SCSI interface card. The system is said to be slow when writing to the disc compared to a hard drive, and initially it will probably be very expensive compared to hard drives. For these reasons I believe read/write compact disc drives are not practical for the majority of CoCo users.

Accessing a Disk

I have an FD-502 single disk drive and double-sided disks. How do I access the other side of the disk?

Sabine Foulds
British Columbia

Radio Shack's Disk Extended Color BASIC was not written for using double-sided disk drives, but the FD-502 is a double-sided disk drive. Under OS-9 you can use both sides of the disk or, if you buy *ADOS* for your CoCo 2 (see ads from SpectroSystems in THE RAINBOW), have it burned into an EPROM and substitute it for your disk ROM.

Hard Drives and the Multi-Pak

Is it possible to add a hard drive to a CoCo system without using a Multi-Pak Interface?

Walt Jones
Georgetown, Delaware

Yes, you need to be using a Disto/CRC Super Disk Controller and one of Disto's mini expansion cards that supports a hard drive or the Eliminator. You may need to replace your present disk controller. Check out my article on hard drives for the CoCo in the March 1989 issue (Page 44) of THE RAINBOW for more details.

Drive 0 and 1 Differences

What is the difference between Drive 0 and Drive 1 from Radio Shack?

Doug Fischer
Hempstead, Maryland

Older full-height Radio Shack Drive 0s differ from Drive 1s in that the Drive 0 case drive has a terminator resistor plugged into it; Drive 1 does not. Both the old full-height

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Drive 0s and Drive 1s are jumpered (via traces on the PC board of the drive) to "think" they are simultaneously Drives 0, 1, 2 and 3. Drive selection is performed by pulling teeth from the 34-pin edge connector used to hook to the drive. Some of the later half-height Radio Shack drives use this approach to drive selection while others use the normal method of jumpering only one set of drive select jumpers on the drive.

Interchanging Joysticks

What do I need to do to modify an IBM joystick for use on a Color Computer? How about modifying a CoCo joystick for use with an IBM PC-type computer?

Dennis McMillian
Pittsburg, California

The conversions can be made fairly easily if you are a competent and patient hacker. You need to understand the differences and similarities between IBM joysticks and CoCo joysticks. IBM-type joysticks use a 15-pin DB-type connector. The pin-out on that connector is as follows:

Pin #	Function
1	+5 VDC
2	Button 1
3	*x*-axis wiper
4	Ground
5	Not connected
6	*y*-axis wiper
7	Button 2

The remaining pins are unused.

The CoCo joystick connector is a 6-pin DIN connector and is wired as follows:

1	*x*-axis
2	*y*-axis
3	Ground
4	Button 1
5	+5 volts
6	Button 2

You cannot rewire the connectors or make up a simple adaptor to convert an IBM joystick to a CoCo joystick or vice versa. You need to open up the joystick and rewire inside the joystick in addition to changing the connector. Here's why: The potentiometers on it are wired differently from those of the CoCo joystick. On the CoCo joystick one side of each potentiometer is hooked to +5 volts and the other side to ground, with the wiper of the *x* and *y* axis potentiometers used to sense *x* and *y* position. On the IBM joystick the potentiometers are (technically speaking) actually used as rheostats, not as potentiometers.

What this means is that the IBM joystick uses only the wiper and *one side* of the potentiometer. One contact of the pot goes to +5 volts, the other to the axis pin of the connector. Neither side of the pot hooks to ground. Worse, sometimes the maker of the IBM joystick wires the wiper of one or both pots to +5 volts and the other side to the *x* or *y* axis pin.

On the positive side the values for CoCo and IBM joystick pots are the same (50,000 to 100,000 ohms), and the buttons on both CoCo and IBM joysticks are wired similarly (one side to ground and the other side of each button to the appropriate button contact pin on the connector).

With the above information in mind, a competent hacker should be able to easily convert CoCo joysticks to IBM joysticks and vice versa, using a change of connectors and a half-hour or so to make minor revisions of the internal wiring in the joystick itself. I've successfully converted numerous IBM PC joysticks for use with my CoCo.

Using the Touch Pad

How can I use my TRS-80 Touch Pad and High-Resolution Joystick Interface on my CoCo 2 and 3? Can I modify my Touch Pad for use with my IBM PC compatible?

Billy R. Pogue
Lake Havasu, Arizona

It might be a little tricky using the touch pad with the IBM PC because some touch pads have circuitry inside. If yours does, forget about using it with an IBM PC. If it is wired directly to the CoCo 6-pin connector, you can modify it for use with an IBM PC, as I showed Dennis McMillian above. Open it up and check it out.

As for the Tandy Hi-Res adapter, it is best used only with custom software designed for it such as *CoCo Max 3* and *Color Max Deluxe*. Several years ago RAINBOW ran a series of articles by Steve Bjork (July through September, '86) describing how the Hi-Res adapter works and presenting some assembly language and BASIC code designed to help programmers use it.

Interchangeable Chips

There have been occasional reports of odd occurrences after replacing the 68B09E with the CMOS Hitachi 6309E, a chip supposedly compatible with the 68B09E. My experience has uncovered an obscure difference between the 68B09E and 6309E: On the 68B09E when an invalid op-code is encountered, the processor ignores the invalid operation and goes on to look at the very next byte of the program as code. But when the 6309E sees an invalid op-code, it often ignores not only the invalid code but the next byte or two as well. This probably relates to the prefetch stack in the 6309E. This difference between the two processors causes problems only when the computer is asked to read defective code that contains invalid op codes, of course. Under all other conditions, the two can be considered interchangeable, as far as I know.

Kevin Darling
Raleigh, North Carolina

Thanks for sharing that information, Kevin.

Do I Need More Memory?

How do I upgrade the memory of my CoCo 2, and of what use is it to me to do so?

Todd Reaves
New Haven, Connecticut

All CoCo 1s and 2s should be upgraded to the full 64K memory capacity they can support. Very little commercial software for those machines runs on machines with less memory. For more information on upgrades, see the March '89 issue, Page 44.

Need Service Manual

How do I get hold of a service manual for my CoCo 2?

Jorge de la Pena
Queretaro, Mexico

Service manuals for almost all Tandy computer equipment are available directly from Tandy National Parts in Fort Worth, Texas. You must specify the catalog number of your Color Computer and then ask for the service manual. To contact Tandy National Parts and order parts for your Radio Shack equipment, call toll-free in the United States (800)442-2425 or (817)870-5600 from other areas. There is a $5 minimum for all orders.

Building My System

I have an FD-502 double-sided drive system, to which I added a second double-sided disk drive. How do I go about adding two more single-sided full-height drives to this system?

Charles R. Beam
Opelousas, Louisiana

My advice to you is to not try to add single-sided drives at all but to use both sides of those two double-sided drives. Under OS-9 do this by installing proper drivers, under RS-DOS, by purchasing *ADOS* and burning that into an EPROM, which you install in your disk controller.

Single-sided and double-sided drives can be mixed on the same system. If you are using both sides of the double-sided drives, you can add only one extra physical drive; not two extra drives. The reason for this is that Pin 32 of the CoCo disk controller, used as a side select line with double-sided drives, is also used to select the fourth drive (Drive 3) in four-drive, single-sided drive systems.

To add a third physical drive to a two-drive system involves the usual considerations: Make sure the added drive does not contain a terminator resistor; add a connector to the drive cable or make up a new cable with the additional connector; and make sure the added drive is jumpered so that it thinks it is the given drive number (probably Drive 2 in this case) you want.

On older Tandy full-height drives, this becomes a bit more complex because Tandy used to select drives by pulling teeth from the 34-pin connector going to a given drive.

Tandy pulled the three teeth for all drive selects other than the drive it wanted the connector to select, and then wired the drives so that the drives computed themselves, simultaneously, as all four drives. Thus Tandy used connectors with missing teeth instead of jumpers on the drive to select which drive was which.

To integrate one of those drives to an existing, more modern system, you need to either modify the drive logic board itself to allow it to be appropriately jumpered or make up a custom cable that has properly prepared connectors with the appropriate missing teeth.

Onscreen Letter Jumble

I removed a program pack from my CoCo and now when I turn it on, all I get is a jumble of letters. How can I fix this?

James M. Haynes
Dallas

If you remove a program pack, disk controller or Multi-Pak from a CoCo with the power to the CoCo still on, you risk seriously damaging one or more chips in the Color Computer, as you have apparently done. The chip most likely to be damaged on all models of the CoCo, in this case, is the 6809E chip. On older CoCos this chip is socketted and easily replaced. It costs about $6 from electronic supply houses. On the CoCo 1 and 2 you can also damage the 6883 chip (also called the 74LS783 or 74LS785, depending on the model of the CoCo). This chip can be ordered from Radio Shack National Parts or from several CoCo advertisers.

On the CoCo 3 the 68B09E is most likely to be damaged in that situation. It needs to be carefully and completely desoldered, a socket put in its place, and a new 68B09E installed. This is a job for an experienced hardware tinkerer; novices run a risk of damaging the delicate traces on the circuit board during a first attempt to desolder a 40-pin chip.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt , type `ASK` (for Ask the Experts) to arrive at the EXPERTS> prompt , where you can select the "CoCo Consultations"online form, which has complete instructions.

KILLER A's
by William Cotton
New for the CoCo III
Vanquish your fear of the unknown. Rid your base and its ships of the deadly aliens. Just like the arcade version, this game is sure to be a winner.
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This sequel to Buried Buxx is for the CoCo 3 and has better graphics, more color and lots of non-stop action. Game configuration screen, high score save and more! Joystick required. $24.95

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Music Class 101

by Fred B. Scerbo
Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

I was recently struck by a strange virus that has left me flat on my back for over a week. But amid the aches and pains I have put the finishing touches on this month's "Wishing Well." It is about a music instruction program called *Music 101*.

The Program

Many months ago I received a letter from a mother who furnished me several articles' worth of ideas. The first was for the already published upper- and lowercase letters program called *Letters*.

Her next suggestion involved a musical education program. *Music 101* is the first such program to come from this suggestion. (*Music 102* will follow.)

What *Music 101* does is to let the user review some of the major musical terms and signs needed to correctly read music. All the information needed to draw the graphics is contained in the data statements at the end of the listing.

Using the Program

The program runs like all of my recent educational programs. As usual, the shell of the program remains relatively the same, but the information presented is new. You have three choices:

A) Review Signs
B) Quiz Signs
C) Reverse Signs

Review Signs lets you press ENTER to advance through all the musical signs. Both B and C are the same quiz, but C reverses the choices.

Quiz Signs shows a sign in the upper left corner, and three choices are in the remaining boxes. The space bar lets you advance through the choices. Press ENTER to select one, press @ for the scorecard, and press C to continue where you stopped.

Anyone familiar with any of my recent programs will have no difficulty running this one. Remember, the program is just another educational tool and is not meant to take the place of regular instruction.

Music 102 should follow in next issue's column. It will deal with a different aspect of musical education for the beginner.

Errors, Errors, Errors

Every month I receive several letters from individuals who tell me they keep getting an ?FC Error somewhere in the listing. Once again, in most cases this means you have made a mistake while typing in the data statements. It may be as simple as having left out a comma so double-check all your statements. ❑

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

32K Extended

35	167
80	93
130	149
205	31
285	210
345	46
400	172
450	66
485	78
525	186
560	50
600	119
640	143
END	237

The Listing: `MUSIC101`

```
1 REM***************************
2 REM* MUSIC 101:MUSICAL SIGNS *
3 REM*   COPYRIGHT (C) 1989    *
4 REM*    BY FRED B. SCERBO    *
5 REM*    60 HARDING AVENUE    *
6 REM*  NORTH ADAMS, MA 01247  *
7 REM***************************
8 CLEAR3000
9 CLS0:PRINTSTRING$(32,220);STRI
NG$(32,204);:FORI=1TO224:READA:P
RINTCHR$(A+128);:NEXT
10 PRINTSTRING$(32,195);STRING$(
32,211);
15 PRINT@390,"    MUSICAL SIGNS
  ";
20 PRINT@422,"  BY FRED B.SCERBO
  "::PRINT@454," COPYRIGHT (C) 1
989 ";
25 DATA61,60,60,62,60,61,48,61,,
,,62,48,62,60,60,60,61,48,61,56,
53,60,60,60,61,48,,,,,
30 DATA53,,,58,,53,,53,,,,58,48,
58,,,,,,53,,53,,,,,,,,,
35 DATA53,,,58,,53,,53,,,,58,48,
58,,,,,,53,,53,,,71,,78,76,76,74
,65,74
40 DATA53,,,58,,53,,53,,,,58,,60
,60,60,60,61,,53,,53,,,69,,74,,6
4,74,,74
45 DATA53,,,58,,53,,53,,,,58,,,,
,,53,,53,,53,,,76,72,76,76,76,72
,68,76
50 DATA53,,,,,53,,53,,,,58,,50,,
,,53,,53,,53,,,,49,,,,,,
55 DATA60,56,,,,60,56,52,60,60,6
0,56,,60,60,60,60,60,,60,56,52,6
0,60,60,60,,,,,,
60 X$=INKEY$:IFX$<>CHR$(13)THEN6
0
65 DIM P$(18,3),A$(6),B$(18),C$(
18),A(18),N(18),B(4),C(4),D(4),E
(4),F(4),AO(18)
70 FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO18:READP$(I,1),P$(I,
2):NEXT
75 COLOR1,0
80 CLS:PRINT:PRINTSTRING$(32,"="
);:PRINT@102,"AN INTRODUCTION TO
":PRINT@137,"MUSICAL SIGNS":PRIN
T@199,"A) REVIEW SIGNS":PRINT@26
3,"B) QUIZ SIGNS":PRINT@327,"C)
REVERSE QUIZ"
85 PRINT@388,"<<<SELECT YOUR CHO
ICE>>>"
90 PRINT:PRINTSTRING$(32,"=");
95 X$=INKEY$:X=RND(-TIMER):IFX$=
"A"THEN350ELSEIFX$="B"THEN100ELS
EIFX$="C"THEN645ELSE95
100 CLS0:PMODE0,1:PCLS1
105 LINE(0,0)-(254,170),PRESET,B
110 LINE(6,4)-(122,82),PRESET,BF
115 LINE(128,4)-(248,82),PRESET,
B
120 LINE(6,86)-(122,164),PRESET,
B
125 LINE(128,86)-(248,164),PRESE
T,B
130 DRAW"BM26,188C0NU10R10NU10BR
6R10U6L10U4R10BR6NR10D4NR10D6R10
BR12BU6NE4D2F4BR6R10U6L10U4R10BR
6ND10R10D4NL10BR6NR10D6U10R10D10
BR6NR10U10R10BR6NR10D4NR10D6R10B
R10U10NL4R10D4NL10D6NL14BR6U10R1
0D4NL10D6BR6U10R10D4L10R4F6BR6E4
U2H4"
135 DATA130,6,246,80,6,86,120,16
2,130,86,246,162
140 PAINT(2,2),0,0:PCOPY1TO3
145 PMODE0,4:PCLS1
150 LINE(0,0)-(254,170),PRESET,B
F
155 LINE(8,6)-(120,80),PSET,BF
160 PCOPY4TO2:PMODE0,1:SCREEN1,1
165 DATA"BM2,8C1","BM130,8C0","B
M2,90C0","BM130,90C0","BM2,48C0"
,"BM130,48C0"
170 FORI=1TO18
175 A(I)=RND(18):IFN(A(I))=1THEN
175
180 N(A(I))=1:NEXTI:FORY=1TO18:C
OLOR1,0
185 FORI=2TO4
190 B(I)=RND(3)+1:IFN(B(I))=0THE
N190
195 N(B(I))=0:NEXTI:FORI=1TO4:N(
I)=1:NEXT
200 B=RND(18):IFB=A((Y))THEN200
205 C=RND(18):IFC=B OR C=A((Y))T
HEN205
210 DRAW A$(1):DRAWP$(A(Y),1)
215 DRAW A$(B(2)):DRAWP$(B,2):DR
AWP$(B,3)
220 DRAW A$(B(3)):DRAWP$(C,2):DR
AWP$(C,3)
225 DRAW A$(B(4)):DRAWP$(A(Y),2)
:DRAWP$(A(Y),3)
230 COLOR1,0
235 Z=0
240 PMODE0,4
245 DRAW A$(1)+"C0":DRAWP$(A(Y),
1)
250 DRAW A$(B(2))+"C1":DRAWP$(B,
2):DRAWP$(B,3)
255 DRAW A$(B(3))+"C1":DRAWP$(C,
```

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```
2):DRAWP$(C,3)
260 DRAW A$(B(4))+"C1":DRAWP$(A(
Y),2):DRAWP$(A(Y),3)
265 PMODE0,1:SCREEN1,1
270 LINE(8,6)-(120,80),PSET,B
275 X$=INKEY$:IFX$=" "THEN285ELS
EIFX$="@"THEN655
280 COLOR1,0:LINE(8,6)-(120,80),
PRESET,B:GOTO270
285 Z=Z+1:IFZ=4THENZ=1
290 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
295 X$=INKEY$:IFX$=" "THEN285ELS
EIFX$=CHR$(13)THEN305ELSEIFX$="@
"THEN655
300 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO290
305 IFZ+1=B(4)THEN315
310 NW=NW+1:FORK=1TO5:PMODE0,4:S
CREEN1,1:SOUND10,3:PMODE0,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO290
315 NC=NC+1:PMODE0,4:PCLS1:LINE(
0,40)-(256,126),PRESET,B:LINE(6,
44)-(124,122),PRESET,B:LINE(130,
44)-(248,122),PRESET,B:PAINT(2,4
2),0,0
320 DRAW A$(5):DRAWP$(A(Y),1)
325 DRAW A$(6):DRAWP$(A(Y),2):DR
AWP$(A(Y),3)
330 SCREEN1,1
335 X$=INKEY$:IFX$<>CHR$(13)THEN
335
340 PMODE0,1
345 PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO655
350 PMODE0,2:PCLS1:SCREEN1,1:LIN
E(0,40)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
0,44)-(248,122),PRESET,B:PAINT(2
,42),0,0
355 FORI=1TO18:DRAW A$(5):DRAWP$
(I,1)
360 DRAW A$(6):DRAWP$(I,2):DRAWP
$(I,3)
365 X$=INKEY$:IFX$<>CHR$(13)THEN
365
370 COLOR1,0:LINE(8,46)-(122,120
),PSET,BF:LINE(132,46)-(246,120)
,PSET,BF:NEXTI
375 RUN
380 REM STAFF
385 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8R90"
390 DATA"BD40BR26R8U6L8U6R8BR4R6
ND12R6BR4ND12R10D6NL10D6BR6U6NR8
U6R10BR4NR10D6NR8D6"
395 REM G CLEF
400 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BR24ND40U10F8D4
G8L4G6D6F6R10E6U4H6L6G4D4F2R4E2"
405 DATA"BD40BR20U12R10BD6NL4D6N
L10BR18NR10U12R10BR4D12R8BR4NR10
U6NR10U6R10BR6NR10D6NR8D6"
410 REM F CLEF
415 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BR24BD12NR4U2NR
6NL2U4E4R8F6D8NG12BR4BU3UBU7U"
420 DATA"BD40BR20U6NR8U6R10BD12B
R18NR10U12R10BR4D12R8BR4NR10U6NR
10U6R10BR6NR10D6NR8D6"
425 REM WHOLE NOTE
430 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD16R44F4G4L4H4
E4R4"
435 DATA"BD28BR24NU12R6NU12R6NU1
2BR6U12D6R10D6U12BR6ND12R10D12NL
10BR6NU12R8BR6NR8U6NR8U6R8BD20BL
66ND12F12U12BR6D12R10U12NL10BR4R
8ND12R8BR4NR10D6NR10D6R10"
440 REM HALF NOTE
445 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD16R44F4G4L4H4
E4R4F4U24"
450 DATA"BD28BR30U12D6R10U6D12BR
6U12R10D6NL10D6BR6NU12R10BR4U6NR
8U6R10BD20BL60ND12F12U12BR6D12R1
0U12NL10BR4R8ND12R8BR4NR10D6NR10
D6R10"
455 REM QUARTER NOTE
460 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD16R44F2NL8F2N
L10G2NL8G2L4H4E4R4F4U24"
465 DATA"BD28BR10U12R10D12NH4NF4
NL10BR6NU12R10NU12BR6U12R10D6NL1
0D6BR6U12R10D6L10R4F6BR8U12L4R8B
R6NR8D6NR8D6R8BR6U12R10D6L10R4F6
BD8BL84ND12F12U12BR6D12R10U12NL1
0BR4R8ND12R8BR4NR10D6NR10D6R10"
470 REM EIGHTH NOTE
475 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD16R44F2NL8F2N
L10G2NL8G2L4H4E4R4F4U24NF6D2NF6"
480 DATA"BD28BR20NR8U6NR8U6R8BR6
D12BR6U12R10BD6NL4D6NL10BR6U12D6
R10D6U12BR4R6ND12R6BR6D12U6R10U6
D12BD8BL70ND12F12U12BR6D12R10U12
NL10BR4R8ND12R8BR4NR10D6NR10D6R1
0"
485 REM SIXTEENTH NOTE
490 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD16R44F2NL8F2N
L10G2NL8G2L4H4E4R4F4U24NF6D2NF6D
4NF6D2NF6"
495 DATA"BD28BR8R8U6L8U6R8BR6D12
BR6E6NH6NF6E6BR4R4ND12R4BR4NR6D6
NR6D6R6BR4NR6U6NR6U6R6BR4ND12M+8
,+12U12BR4R4ND12R4BR4D12U6R8U6D1
2BD8BL80ND12F12U12BR6D12R10U12NL
10BR4R8ND12R8BR4NR10D6NR10D6R10"
500 REM WHOLE REST
505 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD16R38D4R10U2L
10"
510 DATA"BD28BR24NU12R6NU12R6NU1
2BR6U12D6R10D6U12BR6ND12R10D12NL
10BR6NU12R8BR6NR8U6NR8U6R8BD20BL
62ND12R10D6L10R4F6BR6NR8U6NR8U6R
8BR6NR10D6R10D6NL10BR10U12L6R12"
515 REM HALF REST
520 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD16R38U2R10U2L
10"
525 DATA"BD28BR30U12D6R10U6D12BR
6U12R10D6NL10D6BR6NU12R10BR4U6NR
8U6R10BD20BL56ND12R10D6L10R4F6BR
6NR8U6NR8U6R8BR6NR10D6R10D6NL10B
R10U12L6R12"
530 REM QUARTER REST
535 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD8R42NH4F2NG4L
2G4F4G4"
540 DATA"BD28BR10U12R10D12NH4NF4
NL10BR6NU12R10NU12BR6U12R10D6NL1
0D6BR6U12R10D6L10R4F6BR8U12L4R8B
R6NR8D6NR8D6R8BR6U12R10D6L10R4F6
BD8BL78ND12R10D6L10R4F6BR6NR8U6N
R8U6R8BR6NR10D6R10D6NL10BR10U12L
6R12"
545 REM EIGHTH REST
550 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD24R42BU4M+10,
-20G4L6H2E2R2G2R2E2"
555 DATA"BD28BR20NR8U6NR8U6R8BR6
D12BR6U12R10BD6NL4D6NL10BR6U12D6
R10D6U12BR4R6ND12R6BR6D12U6R10U6
D12BD8BL66ND12R10D6L10R4F6BR6NR8
U6NR8U6R8BR6NR10D6R10D6NL10BR10U
12L6R12"
560 REM SIXTEENTH REST
565 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90BD24R42BU4M+10,
-20G4L6H2E2R2G2R2E2BD8BR2G4L6H2E
2R2G2R2E2"
570 DATA"BD28BR8R8U6L8U6R8BR6D12
BR6E6NH6NF6E6BR4R4ND12R4BR4NR6D6
NR6D6R6BR4NR6U6NR6U6R6BR4ND12M+8
,+12U12BR4R4ND12R4BR4D12U6R8U6D1
2BD8BL76ND12R10D6L10R4F6BR6NR8U6
NR8U6R8BR6NR10D6R10D6NL10BR10U12
L6R12"
575 REM REPEAT BARS
580 DATA"BD50BR18NR90BU8NR90BU8N
R90BU8NR90BU8NR90D32R2U32R4D32R8
2U32R4D32R2U32D12BL12L2BD8NR2BL7
0R2BU8L2"
585 DATA"BD28BR20U12R8D6L8R2F6BR
6NR8U6NR8U6R8BR6R8D6L8U6D12BR14N
R8U6NR8U6R8BR6ND12R8D6NL8D6BR10U
12L6R12BL66BD20ND12L2R10D6NL8D6N
L10BR6U12R8D6NL8D6BR6U12R8D6L8R2
F6BR6R8U6L8U6R8"
590 REM SHARP
595 DATA"BD40BR48U24BR8D24BE8BU2
M-26,+6BU10M+26,-6"
600 DATA"BD38BR28R8U6L8U6R8BR6D1
2U6R8U6D12BR6U12R8D6NL8D6BR6U12R
8D6L8R2F6BR6U12R8D6L8"
605 REM NATURAL
610 DATA"BD42BR58NU24E6U4H6"
615 DATA"BD38BR32U6NR8U6R8BR6D12
R8BR6U12R8D6NL8D6BR12U12L6R12"
620 DATA"BD40BR52U24D12M+12,-6D1
2ND12M-12,+6"
625 DATA"BD38BR14U12M+10,+12U12B
R6ND12R8D6NL8D6BR8U12L4R8BR6D12R
8U12BR6ND12R8D6L8R2F6BR6U12R8D6N
L8D6BR6NU12R8"
630 REM ACCENTS
635 DATA"BD40BR54M+8,-20M+8,+20B
R12M+20,-8M-20,-8BL40M-20,+8M+20
,+8"
640 DATA"BD38BR14U12R8D6NL8D6BR6
NR8U12R8BR6NR8D12R8BR6NR8U6NR8U6
R8BR6ND12M+10,+12U12BR4R4ND12R4B
R4NR8D6R8D6L8"
645 CLS0:FORI=1TO18:TEM$=P$(I,1)
:P$(I,1)=P$(I,2):P$(I,2)=TEM$:NE
XT
650 GOTO100
655 CLS:PRINT@101,"YOU TRIED"NC+
NW"TIMES &":PRINT@165,"ANSWERED"
NC"CORRECTLY"
660 PRINT@229,"WHILE DOING"NW"WR
ONG."
665 NQ=NC+NW:IF NQ=0THEN NQ=1
670 MS=INT(NC/NQ*100)
675 PRINT@293,"YOUR SCORE IS"MS"
%."
680 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
685 X$=INKEY$:IFX$="Y"THEN RUN
690 IFX$="N"THENCLS:END
695 IFX$="C"THEN265
700 GOTO685
```

Telewriter-128™

the Color Computer 3 Word Processor

TELEWRITER: UNDISPUTED #1

If you've read the other word processor ads, you've probably had your fill of cold lists of features, and claims of ultimate speed, power, and ease of use. So let's try to get past the overblown claims and empty buzz words—with 2 simple facts:

Fact 1: Telewriter is undisputedly the #1 most popular word processor on the Tandy Color Computers.

Fact 2: Telewriter's exemplary ease of use and power have been acclaimed in numerous magazine reviews and in thousands of letters and calls from end users.

THE OTHERS DON'T UNDERSTAND

So why has Telewriter gained such a large and loyal following, while other Color Computer word processors have come and gone? Ironically, our competitors' ads tell you *exactly* why.

For them, word processing is nothing more than features and numbers. The longer the list of features, and the bigger the numbers, the better the word processor. Or so they think.

They just don't understand that power and ease of use are not gained by tacking on random features or throwing in freebie utilities or forcing you to use a cumbersome mouse.

Real Power, *true* Ease of Use, and *genuine* Speed can only be attained through thoughtful, logical, intelligent design, attention to detail, and a commitment to the act and the art of writing. That's the Telewriter tradition, and that's the reason for Telewriter's phenomenal success.

TELEWRITER—128: INTELLIGENT DESIGN PERFECTED

And now, Telewriter-128, the latest Telewriter, uses the added hardware power of the Color Computer 3 to bring this intelligent design to its logical perfection.

Telewriter-128 adds unsurpassed speed and important new features to the already impressive arsenal of Telewriter-64. Not just speed for speed's sake, or features for the sake of advertising—but speed where it counts and features that make you a more efficient, more effective writer.

Rainbow magazine put it this way: "Telewriter-128 will set the word processing standard for the Color Computer 3 because it is so simple and user friendly. . . . The 81-page tutorial/user's manual is nicely done. It is written in easy to understand language but the program itself is so easy. . . . Most people will be able to use the software right out of the package."

TELEWRITER-128 OR DESKTOP PUBLISHING

Desktop publishing is nice for adding pictures and fancy fonts to newsletters or business presentations—but its graphics orientation sacrifices some important capabilities when it comes to working with words.

If your main concern is expressing ideas through words (notes, letters, reports, papers, novels, etc.), the dedicated word processing power of Telewriter-128 still provides the most efficient tool for the job. Each tool has its place—desktop publishing for striking visuals, Telewriter-128, for effective writing.

TELEWRITER-128 OR TELEWRITER-64

You can no longer afford to be without the ease, power, and efficiency, that Telewriter brings to everything you write.

Telewriter-128 for the Color Computer 3 costs $79.95 on disk, $69.95 on cassette.

For the Color Computer 1&2, **Telewriter-64** costs $59.95 on disk, $49.95 on cassette.

To order by MasterCard or Visa,
call **(619) 755-1258** anytime, or send check to:

COGNITEC
341-A 14th Street
Del Mar, CA 92014

(Add $2 S&H. Californians add 6% tax. To upgrade from TW-64 to TW-128 send original TW-64 disk and $41.95.)

$30 off! Send us the disk label, disk jacket, manual cover, or receipt from any CoCo word processor and take $30 off the price of Telewriter-128 disk ($20 off the price of Telewriter-128 cassette).

FEATURES THAT MATTER: Telewriter's outstanding design and its complete set of features, put it in a class by itself, for smooth, efficient writing and letter perfect printed documents. Telewriter-128 includes:

Unbeatable SCREEN PERFORMANCE: lightning fast paging and scrolling, on-screen text that never lags behind your typing, and a response that is always instantaneous, no matter how much text is in the buffer, or where you are in the document.

26 User definable MACRO KEYS type your often used phrases and titles with a single keypress—saving you time and freeing your concentration for writing. User settable DUAL SPEED CURSOR moves you anywhere on the line, on the page, or in the document, fast or slow—you decide, with the touch of a finger. Fast PRINT PREVIEW MODE shows you text as it will print: headers, footers, margins, page breaks, page numbers, justification—saves time and paper and guarantees perfect looking documents everytime.

Instant, ON-LINE HELP summarizes all Telewriter-128 commands and special symbols. The Online OPTIONS MENU lets you instantly customize the writing environment at any time to suit your precise needs (Screen/character color, Monochrome on/off, Key repeat/delay rate, 2 Cursor repeat/delay rates, Case-sensitivity of search, Auto file backup on/off, and more). A SINGLE FUNCTION KEY takes you instantly to any menu, so you never have to stop and think.

The 24, 25 or 28 LINE SCREEN DISPLAY option lets you see 16% more on-screen text (28), or wider line spacing (25). The auto-loading OPTIONS FILE stores all your Macros, Print Format settings, and Options Menu settings, so they are always there everytime you run Telewriter-128. 3 pop-up STATUS WINDOWS tell you cursor position, word count, free space, etc.

The QUICK SAVE feature lets you instantly save your current document with just 2 keystrokes and without leaving the editor. CURSOR THROUGH DIRECTORY to Load, Append, Rename and Kill files—so you'll never type a filename after the first time. HANGING INDENTS help you organize ideas on the page more effectively. Also: Footers, Multiple Print, Print to Disk, Key Click, Key Repeat, 40/80 Column Option, Overstrike, Word Delete, Nested Macros, Definable Foreign and Math Symbols and more. . . .

And, of course, Telewriter-128 incorporates all the Features of TELEWRITER-64, like: Works with *absolutely any printer* that works with your Color Computer (1, 2, or 3). Uses simple Embedded Control Codes so *all* intelligent features of your printer are easily accessed, including: Underlining, Boldface, variable Fonts, Sub-script, Super-script, Italics etc.

Format commands allow dynamically changing Margins, Headers, Spacing, Centering, etc., anywhere in the document. Format menu sets Margins, Spacing, Page numbering, Baud rate, Lines per page, Justification. Chain Printing means the size of your printed document is unlimited. Also Single page and Partial Print.

Fast full-screen editor with wordwrap, text alignment, block copy/move/delete, global search and replace, wild card search, fast 4-way auto-repeat cursor, fast scrolling, forward and backward paging, settable tabs, word and line counter, full error protection. Insert or delete anywhere on screen. Simple, easy to remember, "mnemonic" Editor Commands. Load, Save, Append, Partial Save files to disk or cassette. Kill, rename and list disk files. ASCII file compatibility.

An important link in the CoCo community is communication among fellow users. If questions arise, a fresh source of information can be invaluable. The Intercom is offered as an information exchange point for pen pals, CoCo clubs and BBSs.

If you would like a pen pal or are running a CoCo club or BBS, send a letter including all pertinent information to: THE RAINBOW, *P.O. Box 385, Prospect, KY 40059. Mark it Attn: The Intercom.*

You will be asked to sign a non-piracy agreement — only information from those who have signed our non-piracy agreement form will appear in The Intercom. Also, please notify us of any changes in the status of your club or BBS.

Pen Pals

- I would enjoy having some pen pals. I have a CoCo 3, dual disk drive and modem. I like Adventures very much.

Patrick Benny
69 2nd Chaloupe, RR1
Joliette, PQ J6E 7Y8
Canada

- I have a CoCo 2 and 3, two DSDD disk drives, a DMP-200, Multi-Pak, Speech Pak, *Musica II* and a stereo pak. I am 15 years old.

Desmond Rae
P.O. Box 2076
Mt. Isa, Queensland 4825
Australia

- I am looking for a pen pal of any age. I'm 14 years old and own a CoCo 3 (512K), CoCo 2, CM-8 monitor, Multi-Pak Interface, two DSDD 40-track drives, and a Maestro 2400-baud modem. I will reply to all who write me.

Damien Sugden
10 Drinkwater Crescent
Sunshine, Victoria 3020
Australia

- I am a 14-year-old student from Melbourne, Australia. I have a CoCo 3, CoCo 2, 80-track disk drives, modem, DMP-105 and a lot of other stuff. I am into everything — mostly databases, communications and games. I would like pen pals from all over the world, especially America, and I will reply to every letter received.

Hamish J. Purdey
31 Fullwood Parade
Doncaster East, Victoria 3109
Australia

- I am 14 years old and would like a pen pal from anywhere in the world. I have a CoCo 3, CoCo 2, DMP-105, FD-501 drive and CCR-81 cassette recorder. I enjoy games, Adventures and utility software. My hobbies are computing and skateboarding. I will answer all letters.

Luis Eduardo Voysest
P.O. Box 2659
Lima-1, Peru

- I'm 11 years old. I own a CoCo 3 and am looking for a pen pal in the United States. I'll answer all letters.

Chuck Carpinello
11 Riverside Ave.
Rensselare, NY 12144

- I am 12 years old and have a 512K CoCo 3, two TRS-80 disk drives, a DCM-3 modem, Multi-Pak Interface and an RGB monitor. I'm hoping to get a printer soon. I have three OS-9 programs. I would like for somebody to give me some tips on *Wild West*. Some of my hobbies are sports, writing to pen pals, drawing and caring for animals. I would prefer boys and girls 11 to 16 years old. I will try to respond to all letters.

Naomi West
944 Mosby Rd.
Memphis, TN 38116

- I am 13 years old and would like pen pals from all over the world between the ages of 10 and 17. I have a CoCo 2, CoCo 3, an FD-500 disk drive and a DMP-105. I enjoy playing games and writing on the CoCo. I'm also interested in reading mysteries, showing dogs and some sports.

Jessica Diehm
RD#3, Box 461-A
Lewisburg, PA 17837

- I am 18 years old and would like pen pals from anywhere in the world. I have a CoCo 3, FD-501 drive, DMP-105, CCR-81 recorder and DCM-7 modem. I love video games, graphics, music, utilities, telecommunications and just about anything that has to do with computers. I am also interested in reading and writing science fiction and listening to all types of music (with the exception of most pop/top 40).

Jeff Byers
124 Elizabeth St.
East Peoria, IL 61611

CoCo Clubs

Arizona
Tucson Color Computer Club, Bruce Smith, 3030 Mustang Dr., Tucson, 85708; (602) 747-7859

California
Citrus Color Computer Club, Orville Beaver, P.O. Box 6991, San Bernardino, 92412-6991; (714) 685-6334

Color America Users Group, Jack W. Eizenga, 3811 N. Foster Ave., Baldwin Park, 91706-3912; (818) 960-8010

Connecticut
South Eastern Connecticut Color Computer Users Group, Larry Donovan, 25 Stony Brook Rd., Stonington, 06378; (203) 535-4211

Georgia
Atlanta Computer Society, Inc., Alan R. Dages, 4290 Bells Ferry Rd., Suite 10639, Kennesaw, 30144; (404) 469-5111(voice), (404) 636-2991(modem)

Idaho
Snake River Color Computer Club, Emil Franklin, 1750 Carmel Dr., Idaho Falls, 83403; (208) 522-0220

Illinois
Motorola Micro Computer Club, Steve Adler, 1301 East Algonquin Rd., Shaumburg, 60196; (708) 576-3044

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Starved Rock Color Computer Club, Neal Roberts, 1250 E. Bluff, Marseilles, 61341; (815) 795-4894

Iowa
Metro Area Color Computer Club, Joe Cavallaro, 2425 Ave. A, Council Bluffs, 51501; (712) 322-2438

Maryland
Arkade, John M. Beck, 3513 Terrace Dr. #D, Suitland, 20746; (301) 423-8418

North Carolina
Norca Users Group, Matthew Royal, Rt. 21, Box 906, Fayetteville, 28304; (919) 484-1230

Rhode Island
New England CoCoNuts Color Computer Club, Arthur J. Mendonca, P.O. Box 28106, North Station, Providence, 02908; (401) 272-5096 (Sig3)

South Carolina
Spartanburg CoCo Club, Jesse W. Parris, 152 Bon Air Ave., Spartanburg, 29303; (803) 573-9881

Texas
The Codis CoCo Symphony, William C. Garretson, 2902 Harvard St., Irving, 75062; (214) 570-0823

Australia
Australian National OS-9 Users Group, Gordon Bentzen, C/- 8 Odin Street, Sunnybank, Queensland 4109; (07) 345-5141

Brisbane Southwest Colour Computer Users Group, Bob Devries, 21 Virgo St., Inala, Queensland 4077; (61) -7-3727516

Canada
Halifax Dartmouth Color Computer Users Group, David H. Haley, Comp. #7 Greenforest Subdivision, RR#1 Lower Sackville, NS, B4C 2S6; (902) 864-0454

Les CoCophiles Du Sud-Ouest, Jean Labrose, 20 Ste-Julie #A, Vaudreuil, PC, J7V 1B5; (514) 455-0486

BBSs

State/City	BBS Name	Access Number	Parameters (Baud rate-Parity-Word Bits-Stop Bits)	SysOp
Arizona				
Peach Orchard	Communications Central BBS HST	(501) 249-3814	300/19,200-N-8-1	Perry Parsons
Florida				
Miami	A Little R S R	(305) 266-1099	300/1200-N-8-1	Robert Jones/Robert Caraballo
Massachusetts				
Worcester	Gosub BBS	(508) 756-1442	300/1200/2400-N-8-1	Richard Bostock
Minnesota				
Brainerd	Brainerd 4-Way[1]	(218) 828-1144	300/1200/2400-N-8-1	Mike Lowe
New Hampshire				
Allenstown	The CoCoBean BBS	(603) 485-8682	300/1200/2400-N-8-1	David Bean
New Jersey				
High Bridge	Hilltop BBS	(201) 638-5698	300/1200/2400-N-8-1	Guy Silliman
Mercerville	TAO BBS	(609) 587-2672	300/1200/2400-N-8-1	Bob Watson
Ohio				
Bellaire	The Phantasm BBS	(614) 676-2505	300/1200/2400/9600-N-8-1	Dave Roth
Pennsylvania				
Palmer	ASCII =80=	(215) 252-1608	300/1200/2400-E-7-1	Nevin Keller
Tennessee				
South Pittsburg	Base-Net BBS	(615) 837-8352	300/1200/2400-N-8-1	Howard Bacon
Virginia				
Henry	Public Access[2]	(703) 365-2018	300/1200-E-7-1 or N-8-1	Ricky Sutphin
Wisconsin				
Gays Mills	CoCo BBS	(608) 735-4509	300/1200/2400-N-8-1	Robert & Daven Howard
Marshall	Madison Tandy Users BBS	(608) 655-3806	300/1200/2400-N-8-1	Fran Selje

Notes:
[1] Brainerd 4-way is up from 8 p.m. Saturday to 5 p.m. Friday.
[2] Public access is up fom 12:30 a.m. to 9 a.m. Monday through Sunday.

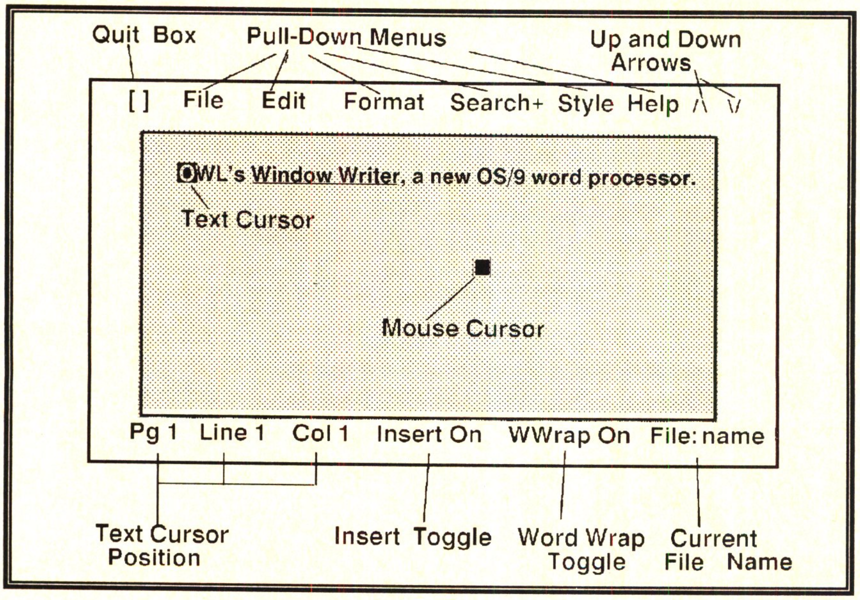
NEW!

Window Writer 1.2

What we believe to be the best word processor available for OS/9 just got better! You asked and we listened. We have added new features which the public has requested!

DYNASPELL 102K WORD SPELLING CHECKER NOW AVAILABLE!

More Versatile and Powerful. OS/9 Allows you Freedom and Power. The mouse and pull-down menus give you speed and ease of use.


Quit Box
Pull-Down Menus
Up and Down Arrows
[ ] File Edit Format Search+ Style Help /\ \/
OWL's Window Writer, a new OS/9 word processor.
Text Cursor
Mouse Cursor
Pg 1 Line 1 Col 1 Insert On WWrap On File: name
Text Cursor Position
Insert Toggle
Word Wrap Toggle
Current File Name

Multi-Tasks

Window Writer is the first Color Computer word processor which takes full advantage of OS/9. The result is a word processor which is fully as modern and professional in action as those previously available only for the IBM and Mac. The operating system allows true multi-tasking with other programs or itself. Not limited to just printing one file and editing another. You can print one file in one window while you edit files in other windows. At the same time you can be running a small program in another window. You can cut and paste between sections of files in different windows.

Hi-Res Display

Window Writer uses an **80-column monitor display** screen for clarity. As shown in the above screen drawing, you can quickly see how to access the menus and help screens. You can determine the current position by page, line number, and column. The mouse can use this section to quickly change to a specific page or line in the file. The text insert and word wrap toggles also are indicated and changeable with the mouse button.

Ram Disk

A RAM disk is set up in **Window Writer** to make full use of all or a user specified portion of the memory on the 512K CoCo 3. On the 128K CoCo a smaller RAM disk is set up to still allow use of all available memory for file editing. For use of all features, a 512K machine is required.

The RAM disk is used for storage of the file(s) being edited, for the clipboard for cut and paste, and as a print spooler for the file being printed. **Window Writer's** clipboard can be saved to disk or pasted into any file being edited because files use the same clipboard memory. The RAM disk also can be used with other OS/9 programs.

Mail-Merge

With **Window Writer** you can create form letters and send them out to a list of addresses in an address file. First names or other information can be added to "personalize" these letters.

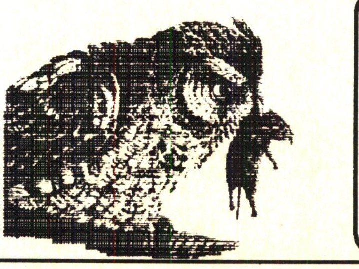
Pull Down Menus and Help Screens

A full selection of pull down menus and detailed help screens make learning easy and are only a key stroke (or mouse click) away. All menus and help screens can be user configured for everything including menu colors and contents. You don't like the color of a menu? You think one help item should be listed differently? Change them!

The menus and help screens can be reached by cursor keys or the mouse (or joystick) or can be accessed by control keys.

French Version:

An abridged French translation of the **Window Writer** manual is now available. This manual is written by a Canadian CoCo user and will aid French speaking users. **Only $7.50 additional.**



Editing is a snap with OWL's Efficient Mouse Usage!

Editing

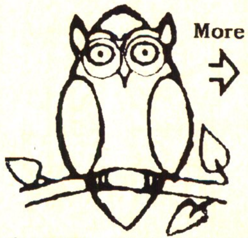
Like most modern word processors, with **Window Writer** there is always more than one way to access any editing feature. You can access editing by menus using mouse, "keyboard mouse", or through control keys. Full help screens are quickly available for all editing features. A help screen can be left visible while needed and then quickly removed to get back to full screen editing.

One nice feature is the price:

only $59.

For the DynaSpell Spelling Checker by Dale Puckett including the 102K Word Dictionary:

only $20. additional!



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The Hard Drive's New Frontier:

The Most Advanced Color Computer Hard Drive System Ever Offered!

Fast No-Halt SCSI Floppies Using Optional SCSI Controller

Proven Performance for Demanding Home or Business Users

OWL-WARE has now been supplying Color Computer hard drive systems for over 4 years. We have reached our position in the hard drive market by providing our customers with a high quality product that they can be proud to own and use. Our first concern has always been quality and sound design.

We are now announcing our most advanced hard drive system ever. **Using the optional OMTI 5200 SCSI controller with our Hard Drive Interface, our new system will support no-halt floppy drives.** You need not wait while typing or worry about clock time losses. Why be limited to 3 floppy drives? A complete system could now consist of 1-3 standard CoCo floppy drives, 1-2 (or more) hard drives, and 1-2 no-halt floppies using standard (not just CoCo) OS/9 format. You can use single or double-sided 40 or 80 track drives with the SCSI no-halt controller.

There are several new features with this improved interface. These include:

- **Full SASI/SCSI compatible (this allows many add-ons to the versatile SCSI buss)**
- **No-Halt Floppies with optional SCSI controller allows full type-ahead during access**
- **Low factory-direct prices**
- **Fast Delivery from factory stock**
- **Optional Real Time Clock with built in battery (3-10 year lifetime)**
- **With the Clock you have 240 Bytes of battery backed up RAM for password protection or data storage!**
- **Same super stable LRTech quality**

Our quality is obvious when compared to any other Hard Drive system or interface. Even the box is special. Our systems have always had a fan. Has our competition just heard about them?

Interface Price only: $85.

Real Time Clock-RAM: $25.

Now Available with High Density 5.25" drives as well as 720K!

Disk Capacity of more than 1 Meg Formatted!

Same low price as our 720K super systems listed below.

	20 Meg.	40 Meg.	80 Meg. (2X40Meg.)
System Prices: (Includes Hard Drive, case, & fan, SASI Controller*, LR/OWL Interface, Software. Fully assembled and tested.)	$519.	$629.	$929.
Super System Prices: (LR/OWL System as above but OMTI 5200 SCSI Controller AND 3.5" 80 Track Floppy Drive in same case)	$649.	$759.	$1099.(2 cases)

*SASI controller is unused surplus. Add $75 for OMTI SCSI

OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes **assembly**, **testing**, and **3-day burn-in** period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 4 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

OWL HD BASIC 3 is very fast due to our index method. Almost all BASIC commands work normally including DSKINI, DSKI$, and DSKO$.

BASIC for Hard Drives Prices: With/Without Hard Drive

$35./$79.

Technology

the Color Computer Frontier

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Special
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The Highest Quality for Years of Service

Drive 0 Systems (Half Height, Double Sided, Direct Drives) **$199.**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) **$129.**

New 3.5", 720K Drives for OS-9 with case & Power Supply **$169.**

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (Drives 0,1,2,3) $295.

HALF- HEIGHT DRIVE UPGRADES FOR RS HORIZONTAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model 500 $119. Model 501 or 502 $129.

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

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DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

3 UTILITIES

A copy verify, copy, and DOS utility.

2 GAMES

We will select 2 games from our stock. These are sold for more than $20 each.

Do not mistake this software with cheap "Public Domain" software which others offer. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

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only $6.95 with
any Disk Drive Purchase!!

512K Upgrade

Again at a popular price. Fully assembled and tested before shipping. Easy to install. Uses fast 120 ns. chips.

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Now includes **memory test, Ram Disk Lighting, Printer Lighting, and Backup Lighting.** All with an upgraded manual exclusive with OWL!

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

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Rainbow Info

How To Read Rainbow

When we use the term CoCo, we refer to an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

The BASIC program listings printed in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service.

Using Machine Language

The easiest way to "put" a machine language program into memory is to use an editor/assembler, a program you can purchase from a number of sources. All you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of putting an ML listing into CoCo is called "hand assembly" — assembly by hand, which *sometimes* causes problems with `ORIGIN` or `EQUATE` statements. You ought to know something about assembly to try this.

Use the following program if you want to hand-assemble ML listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I, VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the `&H3F00` in Line 10 to `&H7F00` and change the value of `I` to `&H7F80`.

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: `CMDS` and `SOURCE`. It also contains a file, `read.me.first`, which explains the division of the two directories. The `CMDS` directory contains executable programs and the `SOURCE` directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the `SOURCE` directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

1) Type `load dir list copy` and press ENTER.
2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the sytem master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
3) List the `read.me.first` file to the screen by typing `list read.me.first` and pressing ENTER.
4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the `CMDS` directory, enter `dir cmds`. Follow a similar method to see what source files are in the `SOURCE` directory.
5) When you find a program you want to use, copy it to the `CMDS` directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/` *filename* `/d0/cmds/`*filename* `-s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/` *filename* `/d0/cmds/` *filename*

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

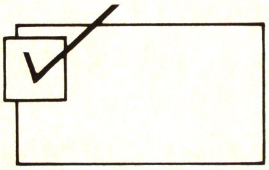
Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification.

The Seal is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command `RUN` and press ENTER. Once the program has run, type `NEW` and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

CoCo Gallery

SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also please include a few facts about yourself.

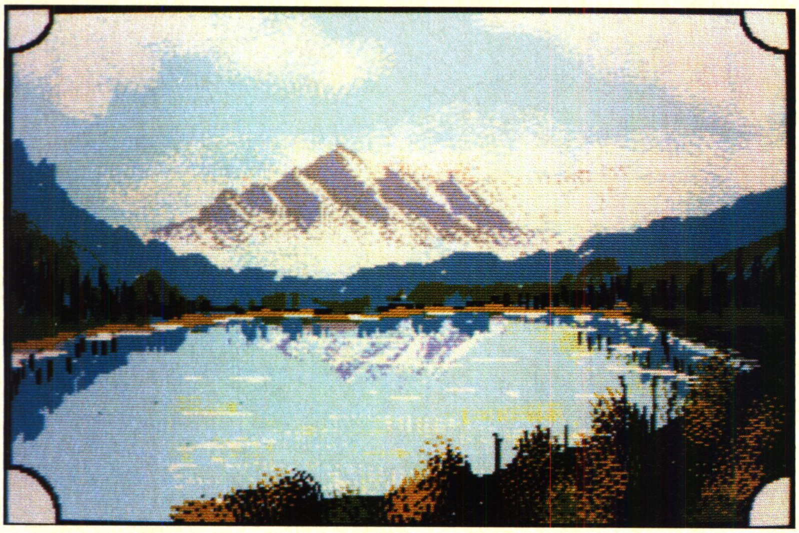
Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is not an original work.

We will award one first prize of $25, one second prize of $15 and one third prize of $10.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

—Tony Olive, Curator

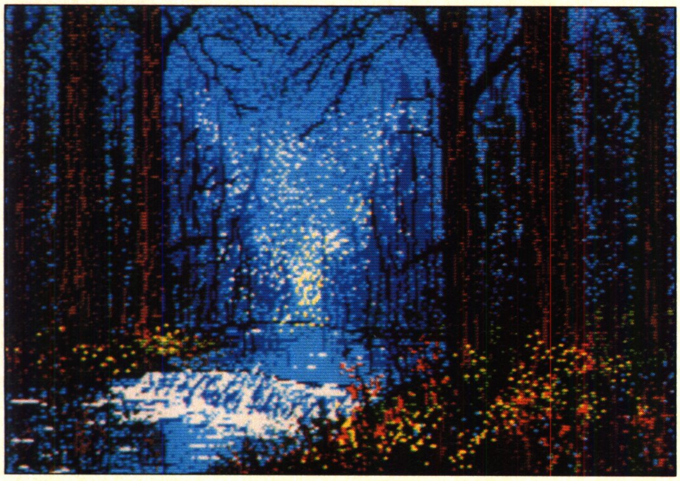
1st Place



Reflect
James J. Gibbons

James, a professional artist and art teacher in Montgomery, Pennsylvania, uses a variety of graphics programs, including *The Rat*, *Micro-Illustrator*, *Sketch*, *The Color Computer Artist*, *CoCo Max II* and *CoCo Max III*, which was used for this picture. He plans to continue working in this field until his pictures look like paintings. James resides in Watsontown, Pennsylvania.

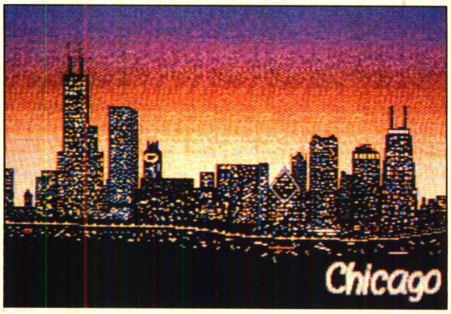
2nd Place



Lake
Wally Mayes

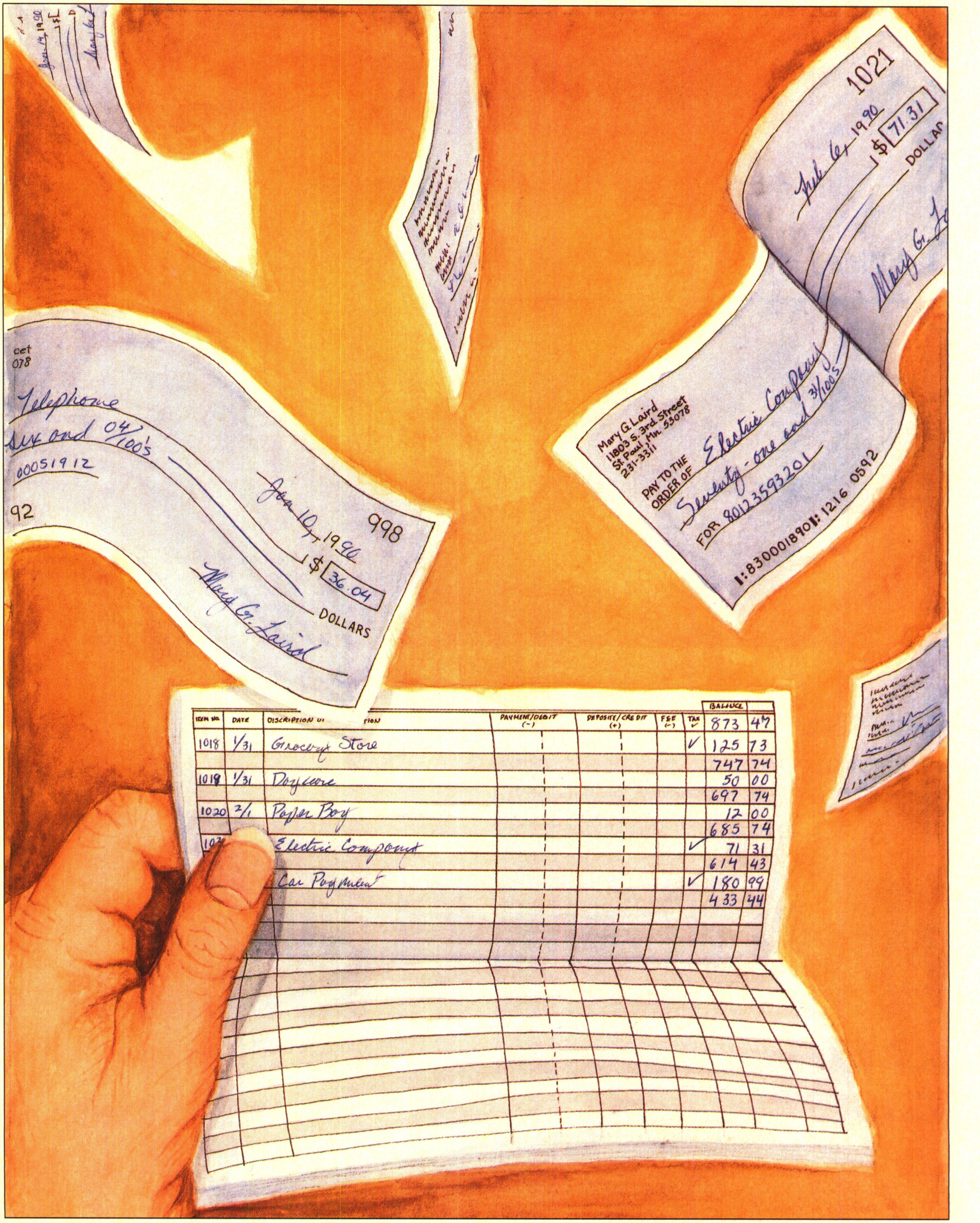
Wally, of Hamilton, Ohio, is a frequent contributor to CoCo Gallery. This entry was produced with *CoCo Max III*. He is married and has four children and three grandchildren. His hobbies include motorcycle drag racing, golf and photography.

3rd Place



Chicago Skyline
Mike Strean

A self-taught programmer who enjoys programming in BASIC as well as OS-9, Mike, from Zion, Illinois, enjoys creating art on computers in his spare time. This skyline was reconstructed with *CoCo Max III*. Mike, a die-hard *Flight Simulator II* fan, plans to get a private pilot's license as soon as he turns 16.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BANK & BUDGET

The Great Balancing Act

by Jerry Shaulis

This program is designed to help you maintain your checkbook. At the month's end, it helps verify the checkbook balance with the bank statement balance. It can also be used to manage your budget. *Checks* uses a basic accounting procedure. Each record (entry or transaction) is like an entry in a general journal and is assigned to a specific account.

The program is written in Disk Extended Color BASIC and runs on any CoCo with at least 32K RAM and one disk drive. A printer is useful but not necessary. The program was written to use a DMP-400 printer so other printers may require the printer control codes in the program to be changed.

To use the program, enter and save the first listing on a disk with the name `CHECK1.BAS`. Then enter and save the second listing on the same disk with the name `CHECK2.BAS`. To start the program, type `RUN "CHECK1"` and press ENTER.

Checks is easy to use, with menus and prompts that lead the way through the program. There are only a few things to remember. When *Checks* is run for the first time, a list of accounts must be established and each record entered is assigned to an account. The program does allow a record to be assigned to an account that has not been established.

An account is like a box into which similar things are put to keep them grouped together. For example, items you would put into an account include payments for car insurance, house insurance, life insurance and medical insurance. They may be assigned to an account named Insurance.

To establish an account, press F at the start-up menu and a menu for Account Routines appears on the screen. From this menu accounts are established, viewed, deleted or sorted. A hard copy of accounts can also be made; this is useful to have because the account to which the record is assigned must be entered exactly as established in the Account Routines. If it is not, the program voids the record entry and asks for it to be entered again.

Return to the start-up menu by pressing F at the Account Routines menu. To enter a record, press A. Each record must have a check or deposit number that starts with a number, not a letter, and can be no longer than nine characters. All records where money is taken out (debit) should have a check number. If the record has a check number, the amount of the record is subtracted to get a balance. All records where money is added (credit) should have a deposit number. If the record has a deposit number, the amount is added to obtain a balance.

Each check and deposit number should be unique. For checks, use the number on the check. For other transactions such as deposits, automatic deposits, cash withdrawal, automatic withdrawal, service

Jerry is a computer numerical control machinist at ESAB North America, which manufactures custom robotic welding equipment. He bought a CoCo in 1982 to learn programming and writes most of the software he uses. He can be contacted at 380 Circle Drive, Fort Collins, CO 80524. Please enclose an SASE when requesting a reply.

charges, etc., use the formula `MMDDYIIN`. `MM` stands for the month, `DD` for the day of the month, and `Y` for the last number of the year. `II` stands for initials for the type of transaction; `N` for the number of times that type of transaction was made that day. Here's an example: On September 25, 1986, two cash withdrawals were made. The number for the second withdrawal would be `09256CW2` (`MM=09, DD=25, Y=6, II=CW, N=2`). The reasoning behind this formula becomes clearer later.

The first prompt asks for the check number. If the amount of the transaction is a debit, type a check number and press ENTER. If the amount of the transaction is a credit, do not type a number, but press ENTER. The second prompt asks for a deposit number. If the amount of the transaction is a debit, type a deposit number and press ENTER. There must be either a check or deposit number, but not both.

The prompts for the deposit number and check number accept nine characters; the Date prompt accepts eight characters; the Paid To prompt, 50; the For prompt, 50; the Account prompt, 11; and the Amount prompt, nine. If more characters are entered than allowed, an alarm sounds and the same prompt reappears.

If nothing is to be entered at a prompt, press ENTER to go to the next prompt. After all prompts have been answered, the message `STATUS NOT VERIFIED` and the balance appear on the screen.

In the Edit routine records can be edited in any order and the status can be changed. The Status prompt accepts one character—either Y or N. Y (Verified) means the record has been compared with the bank statement and is correct. N (Not Verified) means the record has not been compared with the bank statement.

There are two special edit features in the record entry and Edit routines. If a single up arrow is entered at a prompt, the Record Entry process begins again. If two up arrows are entered at a prompt, the start-up menu appears on the screen. When up arrows are used, no data is entered or changed in the file.

In the Delete routine more than one record can be deleted, but they must be deleted in numerical order. For example, if you have Record 10 and then Record 15, do not delete Record 15 and then record 10. When a record is edited or deleted, the program corrects the balance from that record to the end of the file.

The Insert Record routine allows a blank record to be inserted anywhere in the file after Record 1. Only one record can be inserted at a time. The blank record can then be edited with the proper data.

The Other Routines menu selection loads `CHECK2.BAS` into the computer and a different menu appears on the screen. The Statement Verification routine checks the checkbook balance with the statement balance.

All transactions must be entered before the checkbook and bank statement balances can be compared. If they have not, press N, return to the first menu and enter them. Otherwise, press Y to start the verifying process. All transactions listed on the bank statement are then compared with the records in the file. A prompt appears on the screen and asks for a check or deposit number. Enter the check or deposit number for the first transaction listed on the bank statement. If it was a check that was written, use the number on the check. What if it was not a check? The bank statement should list the date and type of each transaction. Use this information in the formula `MMDDYIIN` to get the check or deposit number.

After the check or deposit number has been entered, the program displays the record. If the bank statement and the record agree, press Y. This changes the record status to `VERIFIED`. If they do not agree, press N; the status of the record remains the same.

If the check or deposit number is not found or the record does not agree with the bank statement, there are two choices: Continue the verifying process or stop the verifying process and correct the problem. If the process is continued, make a note of the transaction where there is a problem.

To correct a problem, go back to the first menu. Use View Records to find the record for the proper check or deposit number. Take note of the proper number and return to the verifying process. If the record has wrong information, edit the record and return to the verifying process. If the bank statement is wrong, see the bank.

When all transactions on the bank statement have been verified, press V. The verified balance appears on the screen. This balance should agree with the balance on the bank statement. If there are outstanding transactions, it is not the present checkbook balance. The present checkbook balance can be seen in the last record.

For the rest of the routines on the second menu, follow the prompts. The Other Routines prompt loads `CHECK1.BAS` and returns you to the first menu. Here are some suggestions on how to start keeping your checkbook with this program:

Pick a beginning point in your checkbook. It should be a point where there are no outstanding transactions. The balance at this point should be known to be correct.

Enter the checkbook balance in the first record. The first record does not have a check number but a deposit number. Use the formula `MMDDYIIN`. Enter the date of this

32K Disk

45	142
60	205
115	220
145	58
180	241
220	238
270	7
305	87
350	235
415	117
450	216
485	93
535	188
595	57
630	162
670	121
715	88
740	14
808	30
863	11
END	96

Listing 1: `CHECK1`

```
0 'CHECK1/BAS  CHECK, BUDGET MAN
AGEMENT PROGRAM  VERSION 1.00.00
 09/01/86
1 'COPYRIGHT 1989, FALSOFT INC.
5 GOTO 900
8 DIMD$(165)
10 GOTO 100
25 OPEN"D",#1,"CHECK/ACC",11:FIE
LD#1,11AS CA$:L=LOF(1):RETURN
30 OPEN"D",#1,"CHECK/DAT",157:FI
ELD#1,9AS CN$,9AS DN$,8AS DT$,50
AS PT$,50AS FR$,11AS AC$,9AS AM$
,1AS ST$,10AS BL$:L=LOF(1):RETUR
N
35 LSET CN$=C1$:LSET DN$=D1$:LSE
T DT$=D2$:LSET PT$=P1$:LSET FR$=
F1$:LSET AC$=A1$:LSET AM$=A2$:LS
ET ST$=S1$:LSET BL$=B1$:RETURN
40 IFST$="N"THEN S2$="NOT VERIFI
ED"ELSEIFST$="Y"THEN S2$="VERIFI
ED"
45 CLS:PRINT@35,"RECORD NUMBER "
R" OF "L:PRINT@96,"CHECK NO. . .
"CN$:PRINT"DEPOSIT NO. ."DN$:PRI
NT"DATE. . . . ."DT$:PRINT"PAID
TO . . ."PT$:PRINT"FOR . . . . .
"FR$:PRINT"ACCOUNT . . ."AC$:PRI
NT"AMOUNT. . . .":PRINT"STATUS.
. . ."S2$
50 PRINT"BALANCE . . .":PRINT@36
5,USINGC$;VAL(AM$):PRINT@429,USI
NGCC$;VAL(BL$):RETURN
53 CLS:PRINT@38,"DELETE ACCOUNT
NAME":PRINT@356,"FOR ACCOUNT MEN
U ENTER 0":PRINT@96,"NUMBER OF A
CCOUNT TO BE DELETED?":RETURN
55 CLS:PRINT@40,"DELETING RECORD
S":PRINT@451,"FOR MAIN MENU  PRE
SS ENTER":PRINT@101,"RECORDS MUS
T BE DELETED":PRINT@135,"IN NUME
RICAL ORDER":PRINT@202,"WHICH RE
CORD":PRINT@232,"IS TO BE DELETE
D":RETURN
60 IFR9=0THEN R9=R ELSEIFR<R9 TH
EN R9=R
```

```
61 RETURN
100 CLS:PRINT@32,"CHECK, BUDGET
MANAGEMENT PROGRAM":PRINT@97,"TO
 ENTER RECORDS  -  - PRESS A":PR
INT@129,"TO VIEW RECORDS-  -  -
PRESS B":PRINT@161,"TO EDIT RECO
RDS-  -  - PRESS C"
105 PRINT@193,"TO DELETE RECORDS
 -  - PRESS D":PRINT@225,"TO INS
ERT RECORD  -  - PRESS E":PRINT@
257,"FOR ACCOUNT ROUTINES - PRES
S F":PRINT@289,"FOR OTHER ROUTIN
ES-  - PRESS G"
110 A$=INKEY$:IFA$="A"THEN385ELS
EIFA$="B"THEN545ELSEIFA$="C"THEN
610ELSEIFA$="D"THEN725ELSEIFA$="
E"THEN850ELSEIFA$="F"THEN115ELSE
IFA$="G"THEN RUN"CHECK2"ELSE110
115 'ACCOUNT NAME ROUTINES
120 CLS:PRINT@40,"ACCOUNT ROUTIN
ES":PRINT@99,"ESTABLISH ACCOUNT-
 PRESS A":PRINT@131,"VIEW ACCOUN
TS -  - PRESS B":PRINT@163,"DELE
TE ACCOUNT-  - PRESS C":PRINT@19
5,"PRINT OF ACCOUNTS- PRESS D":P
RINT@227,"FOR MAIN MENU -  - PRE
SS E"
125 PRINT@195,"SORT ACCOUNTS -
- PRESS D":PRINT@227,"PRINT ACCO
UNTS-  - PRESS E":PRINT@259,"FOR
 MAIN MENU -  - PRESS F"
130 A$=INKEY$:IFA$="A"THEN135ELS
EIFA$="B"THEN190ELSEIFA$="C"THEN
230ELSEIFA$="D"THEN340ELSEIFA$="
E"THEN285ELSEIFA$="F"THEN100ELSE
130
135 'ENTER ACCOUNT NAMES
140 GOSUB25:R=L
145 R=R+1:IFR>165THEN185
150 CLS:PRINT@34,"ESTABLISHING A
N ACCOUNT LIST":PRINT@74,"ACCOUN
T "R:PRINT:INPUT"NAME OF ACCOUNT
";C2$:IFC2$="^^"THEN180ELSEIFLEN
(C2$)>11THENPLAY"DCD":CLS:PRINT@
233,"ENTRY TO LONG":FORC=1TO500:
NEXT:GOTO150
155 B$="            ":B1$=C2$+B$
160 IFR=1THEN170ELSEFORR1=1TO R-
1:GET#1,R1:IFCA$=LEFT$(B1$,11)TH
EN165ELSENEXTR1:GOTO170
165 PLAY"DCD":CLS:PRINT@229,"ACC
OUNT ALREADY EXIST":FORC=1TO500:
NEXTC:GOTO150
170 LSET CA$=C2$:PUT#1,R:PRINT@4
49,"ESTABLISH ANOTHER ACCOUNT Y/
N?"
175 A$=INKEY$:IFA$="Y"THEN145ELS
EIFA$<>"N"THEN175
180 CLOSE:GOTO120
185 CLS:PRINT@198,"NO MORE ACCOU
NT NAMES":PRINT@231,"CAN BE ESTA
BLISED":CLOSE:GOTO120
190 'VIEW ACCOUNT NAMES
195 GOSUB25:R=1:IFL=0THEN225
200 CLS:B1=0:PRINT@2,"LIST OF ES
TABLISHED ACCOUNTS":PRINT@36,"TH
ERE ARE "L" ACCOUNTS":B=79:FORR=
R TO L:GET#1,R:B=B+16:B1=B1+1:PR
INT@B,R;CA$:IFB1=20 AND R<L THEN
205ELSENEXTR:GOTO215
205 B1=0:R=R+1:PRINT@450,"TO CON
TINUE LIST PRESS ENTER"
210 A$=INKEY$:IFA$=CHR$(13)THEN2
00ELSE210
215 PRINT@450,"FOR ACCOUNT MENU
PRESS ENTER"
220 A$=INKEY$:IFA$<>CHR$(13)THEN
220
225 CLOSE:GOTO120
230 'DELETE ACCOUNT NAME
235 R=1:R2=0:GOSUB25:OPEN"D",#2,
"TEMP/ACC",11:FIELD#2,11AS T4$:G
OSUB53
240 PRINT@160,"       ":PRINT@128
:INPUTR1:IFR1<>0 AND R1<R OR R1>
L THEN240ELSEIFR1=0THEN CLOSE:GO
TO120
245 FORR=1TO L:GET#1,R:IFR1=R TH
EN265
250 LSET T4$=CA$:R2=R2+1:PUT#2,R
2
255 NEXTR
260 CLOSE:KILL"CHECK/ACC":RENAME
"TEMP/ACC"TO"CHECK/ACC":GOTO120
265 CLS:PRINT@43,"ACCOUNT "R:PRI
NT:PRINT"ACCOUNT NAME ."CA$:PRIN
T@452,"DELETE THIS ACCOUNT Y/N?"
270 A$=INKEY$:IFA$=""THEN270ELSE
GOSUB53
275 PRINT@160,"       ":PRINT@128
:INPUTR1:IFR1<>0 AND R1<=R OR R1
>L THEN275
280 IFA$="Y"THEN255ELSE250
285 'HARDCOPY OF ACCOUNTS
290 CLS:PRINT@37,"PRINTOUT OF AC
COUNTS":PRINT@99,"DISABLE PRINTE
R AUTOMATIC":PRINT@137,"LINE ADV
ANCE":PRINT@229,"WHEN PRINTER IS
 READY":PRINT@266,"PRESS ENTER":
PRINT@451,"FOR ACCOUNT MENU  ENT
ER M"
295 A$=INKEY$:IFA$="M"THEN100ELS
EIFA$<>CHR$(13)THEN295
300 GOSUB25:IFL=0THEN335ELSER=1:
C=1
305 PRINT#-2,TAB(24)"CHECK, BUDG
ET MANAGEMENT PROGRAM";CHR$(10):
PRINT#-2,TAB(34)"ACCOUNT LIST";C
HR$(10);CHR$(10)
310 GET#1,R:PRINT#-2,TAB(10)R TA
B(13)CA$
315 R=R+55:IFR>L THEN330ELSEGET#
1,R:PRINT#-2,TAB(30)R TAB(33)CA$
320 R=R+55:IFR>L THEN325ELSEGET#
1,R:PRINT#-2,TAB(50)R TAB(53)CA$
325 R=R-109:IFR>55THEN335ELSEPRI
NT#-2,CHR$(10):GOTO310
330 R=R-54:IFR>55 OR R>L THEN335
ELSEPRINT#-2,CHR$(10):GOTO310
335 CLOSE:GOTO120
340 'ALPHABETIZE ACCOUNT NAMES
345 CLS:PRINT@194,"ALPHABETIZING
 ACCOUNT NAMES"
350 GOSUB25:IFL=0THEN CLOSE:GOTO
100
355 FORR=1TO L:GET#1,R:D$(R)=CA$
:NEXTR:R=R-1
360 FORR1=1TO L:FORR2=R1 TO L:IF
D$(R1)<D$(R2) THEN370
365 D2$=D$(R1):D$(R1)=D$(R2):D$(
R2)=D2$
370 NEXTR2:PRINTR1;:NEXTR1
375 FORR3=1TO L:LSET CA$=D$(R3):
PUT#1,R3:NEXTR3
380 CLOSE:GOTO120
385 'ENTER RECORDS
```

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balance at the Date prompt. The Paid To and For prompts can be left blank or a note can be entered. The Account prompt must be answered with an established account, which might be something such as Cash or Start. Answer the Amount prompt with the checkbook balance at the starting point. The status shows `NOT VERIFIED` and the balance is the same as what you entered for the amount.

Press Y to enter the first transaction after the starting point, then answer the prompts. The balance should be the same as the checkbook balance after the transaction. Next, enter all the other transactions from the starting point to present.

Some of these transactions may have already been verified by previous bank statements. Edit these records and change the status to Verified by entering Y at the Status prompt. Your computer checkbook should now be ready to use.

❑

```
390 GOSUB25:L0=L:IFL0=0THEN395EL
SEFORD=1TO L0:GET#1,D:D$(D)=CA$:
NEXT:CLOSE:GOTO400
395 CLS:PRINT@197,"NO ACCOUNTS H
AVE BEEN":PRINT@234,"ESTABLISHED
":FORC=1TO750:NEXT:CLOSE:GOTO100
400 GOSUB30:R=L:V=0:X=1:X1=1:X2=
1:IFL=0THEN410
405 GET#1,L:V=VAL(BL$)
410 R=R+1
415 CLS:PRINT@39,"RECORD NUMBER
"R:PRINT
420 INPUT"CHECK NO(OR MMDDYIIN)"
;C1$:IFC1$="^"THEN535ELSEIFC1$="
^^"THEN540ELSEIFLEN(C1$)>9THEN P
LAY"DCD":GOTO420
425 IFX=2THEN645
430 INPUT"DEPOSIT NO.(MMDDYIIN)"
;D1$:IFD1$="^"THEN535ELSEIFD1$="
^^"THEN540ELSEIFLEN(D1$)>9THEN P
LAY"DCD":GOTO430
435 IFVAL(C1$)>0AND VAL(D1$)>0OR
 VAL(C1$)=0AND VAL(D1$)=0THEN PL
AY"DCD":CLS:PRINT@101,"EACH RECO
RD MUST HAVE":PRINT@140,"EITHER"
:PRINT@167,"A CHECK NUMBER OR":P
RINT@199,"A DEPOSIT NUMBER":PRIN
T@229,"BUT CAN NOT HAVE BOTH":FO
RC=1TO2000:NEXT:GOTO535
440 IFX=2THEN655
445 INPUT"DATE. . . .(MM/DD/YY)"
;D2$:IFD2$="^"THEN535ELSEIFD2$="
^^"THEN540ELSEIFLEN(D2$)>8THEN P
LAY"DCD":GOTO445
450 IFX=2THEN665
455 INPUT"PAID TO . . .";P1$:IFP
1$="^"THEN535ELSEIFP1$="^^"THEN5
40ELSEIFLEN(P1$)>50THEN PLAY"DCD
":GOTO455
460 IFX=2THEN675
465 INPUT"FOR . . . . .";F1$:IFF
1$="^"THEN535ELSEIFF1$="^^"THEN5
40ELSEIFLEN(F1$)>50THEN PLAY"DCD
":GOTO465
470 IFX=2THEN685
475 INPUT"ACCOUNT . . .";A1$:IFA
1$="^"THEN535ELSEIFA1$="^^"THEN5
40ELSEIFLEN(A1$)>11THEN PLAY"DCD
":GOTO475
485 LSET AC$=A1$:FORD=1TOL0:IFAC
$=D$(D)THEN490ELSENEXTD:PLAY"DCD
":CLS:PRINT@229,"ACCOUNT DOES NO
T EXIST":FORC=1TO500:NEXT:GOTO53
5
490 IFX=2THEN695
495 INPUT"AMOUNT. . . .";A2$:IFA
2$="^"THEN535ELSEIFA2$="^^"THEN5
40ELSEIFLEN(A2$)>9THEN PLAY"DCD"
:GOTO495
500 IFX=2THEN705
505 S1$="N":PRINT"STATUS. . . .
 NOT VERIFIED"
510 IFVAL(C1$)>0THEN V=V-VAL(A2$
)ELSEV=V+VAL(A2$)
515 B1$=STR$(V):PRINTUSING"BALAN
CE      "+CC$;V:GOSUB35
520 PUT#1,R:PRINT"MORE DATA Y/N"
525 A$=INKEY$:IFA$="Y"THEN410ELS
EIFA$<>"N"THEN525ELSECLOSE:GOTO1
00
530 CLOSE:GOTO100
535 IFX1=1THEN415ELSEIFX1=2THEN6
25
540 IFX2=1THEN530ELSEIFX2=2THEN6
20
545 'VIEWING ROUTINE
550 GOSUB30:C0$="####"
555 CLS:PRINT@40,"VIEWING RECORD
S":PRINT@101,USING"THERE ARE"+C0
$+" RECORDS";L:PRINT@138,"IN THE
 FILE":PRINT@451,"FOR MAIN MENU
 PRESS ENTER":PRINT@196,"WHICH R
ECORD IS VIEWING":PRINT@234,"TO
START AT":PRINT:INPUTR
560 IFR<0 OR R>L THEN555ELSEIFR=
0THEN CLOSE:GOTO100
565 GET#1,R
570 GOSUB40
575 PRINT@449,"<^> R-1   <SB> R+
1   <M> MENU"
580 A$=INKEY$
585 IFA$="^" AND R>1 THEN R=R-1:
GOTO605
590 IFA$=CHR$(32) AND R<L THEN R
=R+1:GOTO605
595 IFA$="M"THEN555ELSE580
605 GET#1,R:IFVAL(CN$)>0THEN V=V
-VAL(AM$)ELSEV=V+VAL(AM$)
608 GOTO570
610 'EDIT ROUTINE
615 GOSUB25:L0=LOF(1):FORD=1TOL0
:GET#1,D:D$(D)=CA$:NEXT:CLOSE:X=
2:X1=2:X2=2:R9=0:GOSUB30
620 CLS:PRINT@40,"EDITING RECORD
S":PRINT@451,"FOR MAIN MENU  PRE
SS ENTER":PRINT@106,"WHICH RECOR
D":PRINT@136,"IS TO BE EDITED":I
NPUTR:IFR<0 OR R>L THEN620ELSEIF
R=0 AND R9=0THEN622ELSEIFR>0THEN
625ELSEIFR9>0THEN800
622 CLOSE:GOTO100
625 GET#1,R:GOSUB40:PRINT@454,"E
DIT THIS RECORD Y/N"
630 A$=INKEY$:IFA$="Y"THEN635ELS
EIFA$="N"THEN620ELSE630
635 CLS:PRINT@37,"EDIT CHECK NUM
BER Y/N":PRINT@96,"CHECK NUMBER.
"CN$
640 A$=INKEY$:IFA$="Y"THEN642ELS
EIFA$<>"N"THEN640ELSE644
642 GOSUB60:GOTO420
644 C1$=CN$
645 CLS:PRINT@40,"EDIT DEPOSIT N
O. Y/N":PRINT@96,"DEPOSIT NO. ."
;DN$
650 A$=INKEY$:IFA$="Y"THEN652ELS
EIFA$<>"N"THEN650ELSE654
652 GOSUB60:GOTO430
654 D1$=DN$:GOTO435
655 CLS:PRINT@40,"EDIT DATE Y/N"
:PRINT@96,"DATE. . . . ."DT$
660 A$=INKEY$:IFA$="Y"THEN445ELS
EIFA$<>"N"THEN660ELSED2$=DT$
665 CLS:PRINT@40,"EDIT PAID TO Y
/N":PRINT@96,"PAID TO . . ."PT$
670 A$=INKEY$:IFA$="Y"THEN455ELS
EIFA$<>"N"THEN670ELSEP1$=PT$
675 CLS:PRINT@42,"EDIT FOR Y/N":
PRINT@96,"FOR . . . . ."FR$
680 A$=INKEY$:IFA$="Y"THEN465ELS
EIFA$<>"N"THEN680ELSEF1$=FR$
685 CLS:PRINT@40,"EDIT ACCOUNT Y
/N":PRINT@96,"ACCOUNT . . ."AC$
690 A$=INKEY$:IFA$="Y"THEN475ELS
EIFA$<>"N"THEN690ELSEA1$=AC$
695 CLS:PRINT@40,"EDIT AMOUNT Y/
N":PRINT@96,"AMOUNT. . . ."AM$
700 A$=INKEY$:IFA$="Y"THEN702ELS
EIFA$<>"N"THEN700ELSE704
702 GOSUB60:GOTO495
704 A2$=AM$
705 CLS:PRINT@40,"EDIT STATUS Y/
N":PRINT@96,"STATIS. . . ."ST$
710 A$=INKEY$:IFA$="Y"THEN715ELS
EIFA$<>"N"THEN710ELSES1$=ST$:GOT
O720
715 PRINT:INPUT"STATUS. . . .";S
1$:PRINTS1$:IF S1$<>"Y" AND S1$<
>"N"THEN PLAY"DCD":GOTO715
720 B1$=BL$:GOSUB35:PUT#1,R:GOTO
620
725 ' DELETE ROUTINE
730 GOSUB30:OPEN"D",#2,"CHCKTEMP
/DAT",157:FIELD#2,9AS TC$,9AS T3
$,8AS TD$,50AS TP$,50AS TF$,11AS
 T1$,9AS T2$,1AS TS$,10AS TB$:R=
1:GOSUB55:R9=0:R2=0
735 PRINT@288,"      ":PRINT@256
:INPUTR1:IFR1<>0 AND R1<R OR R1>
L THEN735ELSEIFR1=0THEN CLOSE:KI
LL"CHCKTEMP/DAT":GOTO100
740 FORR=1TO L:GET#1,R:IFR=R1 TH
EN760
745 LSET TC$=CN$:LSET T3$=DN$:LS
ET TD$=DT$:LSET TP$=PT$:LSET TF$
=FR$:LSET T1$=AC$:LSET T2$=AM$:L
SET TS$=ST$:LSET TB$=BL$:R2=R2+1
:PUT#2,R2
750 NEXTR
755 CLOSE:KILL"CHECK/DAT":RENAME
"CHCKTEMP/DAT"TO"CHECK/DAT":IFR9
>0THEN799ELSE100
760 GOSUB40:PRINT@453,"DELETE TH
IS RECORD Y/N?"
765 A$=INKEY$:IFA$=""THEN765ELSE
GOSUB55
770 PRINT@288,"      ":PRINT@256
:INPUTR1:IFR1<>0 AND R1<=R OR R1
>L THEN770
775 IFA$="Y"THEN780ELSE745
780 GOSUB60:GOTO750
799 GOSUB30
800 'ROUTINE FOR RECALCULATING T
HE BALANCE OF THE RECOREDS
805 IFR9>L THEN CLOSE:GOTO100
```

```
806 V=0:IFR9=1THEN808ELSE830
808 FORR=R9 TO L:GET#1,R
810 C1$=CN$:D1$=DN$:D2$=DT$:P1$=
PT$:F1$=FR$:A1$=AC$:A2$=AM$:S1$=
ST$
815 IFVAL(C1$)>0THEN V=V-VAL(A2$
)ELSEV=V+VAL(A2$)
820 B1$=STR$(V):GOSUB35:PUT#1,R:
NEXTR:CLOSE:GOTO100
830 R=R9-1:GET#1,R:V=VAL(BL$):GO
TO808
850 'INSERT EMPTY RECORD
855 OPEN"D",#1,"CHECK/DAT",157:F
IELD#1,157AS Z$:L=LOF(1):OPEN"D"
,#2,"TEMP/DAT",157:FIELD#2,157AS
 Y$
860 R1=0:CLS:PRINT@451,"FOR MAIN
 MENU PRESS ENTER":PRINT@0:INPUT
"   LAST RECORD BEFORE INSERT
 ";R9
862 IFR9=0THEN CLOSE:KILL"TEMP/D
AT":GOTO100
863 IFR9>L THEN860
865 FORR=1TO R9:GET#1,R:LSET Y$=
Z$:R1=R1+1:PUT#2,R1:NEXTR
870 X$="":LSET Y$=X$:R1=R1+1:PUT
#2,R1
875 FORR=R9+1 TO LOF(1):GET#1,R:
LSET Y$=Z$:R1=R1+1:PUT#2,R1:NEXT
R
877 CLOSE:KILL"CHECK/DAT":RENAME
"TEMP/DAT"TO"CHECK/DAT":GOTO100
900 CLEAR 2500:FILES 2,400:C$="$
######.##":CC$="$#######.##":GOT
O 8
```

45	210
105	179
130	29
165	165
200	9
240	234
265	93
315	184
345	211
390	3
405	189
415	217
440	170
475	100
515	194
550	74
590	110
620	225
650	134
685	117
715	110
END	186

Listing 2: CHECK2

```
0 'CHECK2/BAS  CHECK, BUDGET MAN
AGEMENT PROGRAM VERISION 2.00.00
  09/01/86
1 'COPYRIGHT 1989, FALSOFT INC.
5 GOTO 900
10 GOTO100
25 OPEN"D",#1,"CHECK/ACC",11:FIE
LD#1,11AS CA$:L=LOF(1):RETURN
30 OPEN"D",#1,"CHECK/DAT",157:FI
ELD#1,9AS CN$,9AS DN$,8AS DT$,50
AS PT$,50AS FR$,11AS AC$,9AS AM$
,1AS ST$,10AS BL$:L=LOF(1):RETUR
N
40 IFST$="N"THEN S2$="NOT VERIFI
ED"ELSEIFST$="Y"THEN S2$="VERIFI
ED"
45 CLS:PRINT@40,"RECORD NUMBER "
R:PRINT@96,"CHECK NO. . ."CN$:PR
INT"DEPOSIT NO. ."DN$:PRINT"DATE
. . . . . ."DT$:PRINT"PAID TO . .
."PT$:PRINT"FOR . . . . . ."FR$:PR
INT"ACCOUNT . . ."AC$:PRINT"AMOU
NT. . . .":PRINT"STATUS. . . ."S
2$
50 PRINT@365,USINGC$;VAL(AM$):RE
TURN
70 G3$=RIGHT$(G1$,2)+LEFT$(G1$,2
)+MID$(G1$,4,2):G4$=RIGHT$(G2$,2
)+LEFT$(G2$,2)+MID$(G2$,4,2):RET
URN
75 IFVAL(CN$)>0THEN V=V-VAL(AM$)
ELSE V=V+VAL(AM$):RETURN
80 TD$=RIGHT$(DT$,2)+LEFT$(DT$,2
)+MID$(DT$,4,2):RETURN
100 CLS:PRINT@32,"CHECK, BUDGET
MANAGEMENT PROGRAM":PRINT@97,"ST
ATEMENT VERIFACATION PRESS A":PR
INT@129,"SEARCH IN RECORDS -  -
PRESS B":PRINT@161,"PRINTOUT OF
RECORDS  - PRESS C":PRINT@193,"T
OTALS OF ACCOUNTS-  - PRESS D"
105 PRINT@225,"FOR OTHER ROUTINE
S-  - PRESS E"
110 A$=INKEY$:IFA$="A"THEN115ELS
EIFA$="B"THEN235ELSEIFA$="C"THEN
300ELSEIFA$="D"THEN420ELSEIFA$="
E"THEN RUN"CHECK1"ELSE110
112 'BANK STATEMENT VERIFACTION
115 V=0:CLS:PRINT@2,"BANK STATEM
ENT VERIFACATION":PRINT@66,"HAVE
 ALL DEBITS AND CREDITS,":PRINT@
101,"TO DATE, BEEN ENTERED?"
120 PRINT@173,"DEBITS":PRINT@192
," CHECK, CASH WITHDRAWL, SERVIC
E  CHARGE,TELEPHONE TRANSFER, OR
         AUTOMATIC PAYMENTS"
125 PRINT@300,"CREDITS":PRINT@32
0,"DEPOSIT, INTEREST, CASH ADVAN
CE,DIRECT DEPOSIT, PAYROLL SAVIN
GS, OR TRANSFERS INTO YOUR ACCOU
NT"
130 PRINT@449,"PRESS Y TO VERIFY
   N FOR MENU"
135 A$=INKEY$:IFA$="Y"THEN140ELS
EIFA$="N"THEN100ELSE135
140 GOSUB30:IFL<1THEN225ELSEFORR
=1TO L:GET#1,R:IFST$="Y"THEN NEX
TR ELSER1=R
145 IFR-1<>L THEN155ELSE CLS:PLA
Y"DCD":PRINT@65,"ALL RECORDS HAV
E BEEN VERIFIED":PRINT@226,"FOR
VARIFIED BALANCE PRESS V":PRINT@
290,"FOR MAIN MENU    PRESS ENTE
R"
```

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See: Review - December Rainbow.
Dale Puckett - November Rainbow.

The **GCS File Transfer Utilities** provide a simple and quick method to transfer text and binary files from and to a variety of floppy disk formats.

Just place the **PC (MSDOS), RSDOS, FLEX** or **MINI-FLEX** disk into your disk drive - enter a simple command and the file is copied into a **OS-9** file. File transfer back is just as simple. Under Multi-Vue version, just select command from one of three menus.

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Multi-Vue version $54.95
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Standard diskettes are OS-9 format (5.25") add $2.50 for 3.5". Orders must be prepaid or COD. VISA/MC. Add $1.75 S&H, COD is additional.

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(603) 464-3850

OS-9 is a trademark of Microware Systems Corporation and Motorola Inc. MS-DOS is a trademark of Microsoft Corp. FLEX is a trademark of TSC, Inc.

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful, helpful and fun for other CoCo owners.

WHAT TO WRITE: We are interested in what you want to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs that can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

COMPENSATION: We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those wanting more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

```
150 A$=INKEY$:IFA$="V"THEN200ELS
EIFA$=CHR$(13)THEN225ELSE150
155 B0$="":CLS:PRINT@37,"ENTER C
HECK/DEPOSIT NO.":PRINT@196,"FOR
 VERIFIED BANK BALANCE":PRINT@23
6,"ENTER V":PRINT@453,"FOR MAIN
MENU  ENTER M":PRINT@64:INPUTB0$
:IFB0$=""THEN155
160 B1$="              ":B2$=B0$+B1$:
IFB0$="V"THEN200ELSEIFB0$="M"THE
N225
165 FORR=R1 TO L:GET#1,R:IFCN$=L
EFT$(B2$,9)ORDN$=LEFT$(B2$,9)THE
N180ELSENEXTR
170 CLS:PLAY"DCD":PRINT@40,"CHEC
K/DEPOSIT NO.":PRINT@76,B0$:PRIN
T@107,"NOT FOUND":PRINT@164,"TO
CONTINUE VERIFICATION":PRINT@202
,"PRESS ENTER":PRINT@453,"FOR MA
IN MENU  ENTER M"
175 A$=INKEY$:IFA$=CHR$(13)THEN1
55ELSEIFA$="M"THEN225ELSE175
180 GOSUB40:PRINT@458,"VERIFY Y/
N?"
185 A$=INKEY$:IFA$="Y"THEN190ELS
EIFA$="N"THEN155ELSE185
190 C1$=CN$:D1$=DN$:D2$=DT$:P1$=
PT$:F1$=FR$:A1$=AC$:A2$=AM$:S1$=
"Y":B1$=BL$
195 LSET CN$=C1$:LSET DN$=D1$:LS
ET DT$=D2$:LSET PT$=P1$:LSET FR$
=F1$:LSET AC$=A1$:LSET AM$=A2$:L
SET ST$=S1$:LSET BL$=B1$:PUT#1,R
:GOTO155
200 CLS:PRINT@194,"CALCULATING V
ERIFIED BALANCE"
205 FORR=1TO L:GET#1,R:IFST$="Y"
 AND VAL(CN$)>0 THEN V=V-VAL(AM$
)ELSEIFST$="Y" AND VAL(DN$)>0 TH
EN V=V+VAL(AM$)
210 NEXTR
215 CLS:PRINT@200,"VERIFIED BALA
NCE":PRINT@235,USINGCC$;V:PRINT@
451,"FOR MAIN MENU  PRESS ENTER"
220 A$=INKEY$:IFA$=CHR$(13) THEN
225ELSE220
225 CLOSE:GOTO100
230 'SEARCH ROUTINE
235 GOSUB30:FIELD#1,157AS B$:IFL
<1THEN295
240 CLS:PRINT@39,"SEARCH IN RECO
RDS":PRINT@101,"SEARCH IN
PRESS":PRINT@164,"CHECK NUMBER
.  . A":PRINT@196,"DEPOSIT NUMBE
R   . B":PRINT@228,"DATE .  .  .
  .  . C":PRINT@260,"PAID TO .
.  .  .  D"
245 PRINT@292,"FOR  .  .  .  .
. E":PRINT@324,"ACCOUNT .  .  .
 . F":PRINT@356,"AMOUNT  .  .  .
  . G":PRINT@388,"STATUS  .  .
.  . H":PRINT@420,"FOR MAIN MENU
 .  . I"
250 A$=INKEY$:IFA$="A"THEN E=1EL
SEIFA$="B"THEN E=10ELSEIFA$="C"T
HEN E=19ELSEIFA$="D"THEN E=27ELS
EIFA$="E"THEN E=77ELSEIFA$="F"TH
EN E=127ELSEIFA$="G"THEN E=138EL
SEIFA$="H"THEN E=147ELSEIFA$="I"
THEN295ELSE250
255 PRINT:INPUT"SEARCHING FOR: "
;B1$:B=LEN(B1$)
260 FORR=1TOLOF(1):GET#1,R:IFMID
$(B$,E,B)=B1$THEN275
265 IFR=L THEN285
270 NEXTR
275 GOSUB40:PRINT@453,"CONTINUE
SEARCH Y/N?"
280 A$=INKEY$:IFA$="Y"THEN265ELS
EIFA$="N"THEN285ELSE280
285 CLS:PRINT@40,"SEARCH FINISHE
D":PRINT@101,"ANOTHER SEARCH PRE
SS A":PRINT@133,"FOR MAIN MENU
 PRESS B"
290 A$=INKEY$:IFA$="A"THEN240ELS
EIFA$="B"THEN295ELSE290
295 CLOSE:GOTO100
300 'PRINT
305 CLS:PRINT@38,"PRINTOUT OF RE
CORDS":PRINT@99,"PRINT ENTIRE FI
LE  PRESS A":PRINT@131,"PRINT PA
RT OF FILE PRESS B":PRINT@163,"F
OR MAIN MENU -  - PRESS C"
310 A$=INKEY$:IFA$="A"THEN315ELS
EIFA$="B"THEN340ELSEIFA$="C"THEN
100ELSE310
315 CLS:PRINT@38,"PRINTING ENTIR
E FILE":PRINT@100,"DISABLE PRINT
ER AUTOMATIC":PRINT@138,"LINE AD
VANCE":PRINT@195,"PRESS SPACE BA
R WHEN READY"
320 A$=INKEY$:IFA$=CHR$(32)THEN3
25ELSE320
325 GOSUB30:R=1:V=0:C=1:C8=0:IFL
=0THEN CLOSE:GOTO100
330 GET#1,R:GOSUB75:GOSUB375
335 R=R+1:IFR<=L THEN330ELSEIFC=
2THEN GOSUB400ELSECLOSE:GOTO100
338 CLOSE:GOTO100
340 'PRINT PART OF FILE
345 CLS:PRINT@35,"PRINTING PART
OF THE FILE":PRINT@451,"FOR MAIN
 MENU PRESS ENTER":PRINT@99,"DIS
ABLE PRINTER AUTOMATIC":PRINT@13
7,"LINE ADVANCE":PRINT
350 INPUT" DATE PRINTOUT IS TO S
TART AT   MM/DD/YY";G1$:IFG1$=""
THEN345ELSEIFG1$="M"THEN100ELSEP
RINT:INPUT" DATE PRINTOUT IS TO
FINISH AT  MM/DD/YY";G2$:IFG2$="
"THEN345ELSEIFG2$="M"THEN100
355 GOSUB70:GOSUB30:C=1:R=1:C8=0
:V=0:IFL=0THEN CLOSE:GOTO100
360 GET#1,R:GOSUB80:IFTD$>=G3$ A
ND TD$<=G4$THEN GOSUB375
365 R=R+1:IFR>L AND C=2THEN GOSU
B400ELSEIFR>L AND C=1THEN370ELSE
360
370 CLOSE:GOTO100
375 IFC=1THEN380ELSE390
380 IFVAL(CN$)>0THEN E1$=CN$ELSE
E1$=DN$
385 E0=R:E2$=DT$:E3$=PT$:E4$=FR$
:E5$=AC$:E6=VAL(AM$):E7$=ST$:E8$
=BL$:C=2:RETURN
390 IFVAL(CN$)>0THEN F1$=CN$ELSE
F1$=DN$
395 F0=R:F2$=DT$:F3$=PT$:F4$=FR$
:F5$=AC$:F6=VAL(AM$):F7$=ST$:F8$
=BL$
400 PRINT#-2,TAB(4)"RECORD "E0 T
AB(42)"RECORD "F0;CHR$(10):PRINT
#-2,TAB(4)"CKDP "E1$ TAB(42)"CKD
P "F1$;CHR$(10):PRINT#-2,TAB(4)"
DATE "E2$ TAB(42)"DATE "F2$;CHR$
(10)
402 PRINT#-2,TAB(4)"TO   "LEFT$(
E3$,19) TAB(42)"TO   "LEFT$(F3$,
```

RAINBOWFEST®

RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer.

Nowhere else will you see as many CoCo-related products or be able to attend free seminars conducted by the top Color Computer experts. It's like receiving the latest issue of THE RAINBOW in your mailbox!

RAINBOWfest is a great opportunity for commercial programmers to show off new and innovative products for the first time. **Chicago, Illinois is the show** to get information on capabilities for the CoCo, along with a terrific selection of the latest CoCo software. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo— from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

As an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

If you missed the fun at our last RAINBOWfest in Somerset, New Jersey, why don't you make plans now to join us in Chicago? For members of the family who don't share your affinity with the CoCo, there are many other attractions in the Chicago area.

The Hyatt Regency Woodfield—Schaumburg, Illinois, offers special rates for RAINBOWfest.

The show opens Friday evening with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — The CoCo Community Breakfast (separate ticket required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 3 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get the special room rate.

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW affiliate, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

RAINBOWfest - Chicago, Illinois
Dates - April 6-8, 1990
Hotel - Hyatt Regency Woodfield
Rooms - $69 per night, Single or Double

FREE T-Shirt to first five ticket orders received from each state!

YES, I'm coming to **Chicago!** I want to save by buying tickets now at the special advance sale price. Breakfast tickets require advance reservations.

_____ Three-day ticket(s) at $9 each total______
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City ____________________ State __________
Telephone ______________ ZIP ____________
Company ________________________________
☐ Payment Enclosed
☐ VISA ☐ MasterCard ☐ American Express
Account Number __________________________
Exp. Date ______________________________
Signature ______________________________

Advance ticket deadline: March 23, 1990. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price. Tickets will be mailed six weeks prior to show. Children 4 and under, free; over 4, full price.

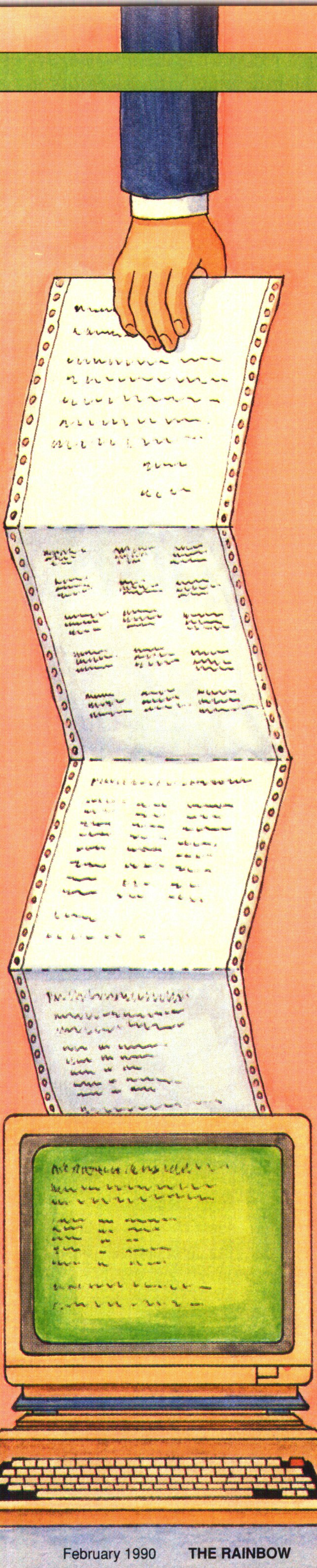
Make checks payable to: THE RAINBOW. Mail to: RAINBOWfest, The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, in Kentucky call (502) 228-4492, or outside Kentucky call (800) 847-0309.

```
19);CHR$(10):PRINT#-2,TAB(4) RIG
HT$(E3$,31) TAB(42) RIGHT$(F3$,3
1);CHR$(10)
403 PRINT#-2,TAB(4)"FOR  "LEFT$(
E4$,19) TAB(42)"FOR  "LEFT$(F4$,
19);CHR$(10):PRINT#-2,TAB(4) RIG
HT$(E4$,31) TAB(42) RIGHT$(F4$,3
1);CHR$(10)
405 PRINT#-2,TAB(4)"ACC  "E5$ TA
B(42)"ACC  "F5$;CHR$(10):PRINT#-
2,TAB(4):PRINT#-2,USING"AMT  "+C
$;E6:PRINT#-2,TAB(42):PRINT#-2,U
SING"AMT  "+C$;F6:PRINT#-2,CHR$(
10)
410 PRINT#-2,TAB(4)"STAT "E7$ TA
B(42)"STAT "F7$;CHR$(10):PRINT#-
2,TAB(4):PRINT#-2,USING"BAL  "+C
C$;VAL(E8$):PRINT#-2,TAB(42):PRI
NT#-2,USING"BAL  "+CC$;VAL(F8$):
PRINT#-2,CHR$(10);CHR$(10);CHR$(
10)
412 C8=C8+2:IFC8=10THEN PRINT#-2
,CHR$(10):C8=0
415 C=1:F0=0:F1$="":F2$="":F3$="
":F4$="":F5$="":F6=0:F7$="":F8$=
"":RETURN
420 'ACCOUNT TOTALING
425 CLS:PRINT@8,"TOTAL OF ACCOUN
TS":PRINT@65,"TOTAL OF EACH ACCO
UNT":PRINT@97,"FOR ENTIRE FILE-
 -  - PRESS A":PRINT@161,"TOTAL
OF EACH ACCOUNT":PRINT@193,"FOR
A CERTAIN PERIOD - PRESS B
430 PRINT@257,"TOTAL OF ONE ACCO
UNT":PRINT@289,"FOR ENTIRE FILE-
  -  - PRESS C":PRINT@353,"TOTAL
 OF ONE ACCOUNT":PRINT@385,"FOR
A CERTAIN PERIOD - PRESS D":PRIN
T@449,"FOR MAIN MENU  -  -  - PR
ESS E"
435 A$=INKEY$:IFA$="A"THEN440ELS
EIFA$="B"THEN520ELSEIFA$="C"THEN
655ELSEIFA$="D"THEN695ELSEIFA$="
E"THEN100ELSE435
440 'TOTAL OF ACCOUNTS FOR ENTIR
E FILE
445 C1=0:CLS:PRINT@37,"TOTAL OF
EACH ACCOUNT":PRINT@72,"FOR ENTI
RE FILE":PRINT@132,"PRINT ON SCR
EEN  PRESS A":PRINT@164,"PRINT O
N PRINTER PRESS B":PRINT@196,"FO
R MAIN MENU    PRESS C"
450 A$=INKEY$:IFA$="A"THEN460ELS
EIFA$="B"THEN455ELSEIFA$="C"THEN
100ELSE450
455 C1=1
460 CLS:PRINT@193,"PROCESSING TO
TALS OF ACCOUNTS":PRINT@232,"FOR
 ENTIRE FILE":GOSUB25:D1=1:C=L:G
1$="":G2$=""
465 FORR=1TO L:GET#1,R:D1$(D1)=C
A$:D1=D1+1:NEXTR:CLOSE:GOSUB30
470 FORR=1TO L:GET#1,R:FORD1=1TO
 C:IFD1$(D1)=AC$THEN475ELSENEXTD
1
475 IFVAL(CN$)>0THEN V(D1)=V(D1)
-VAL(AM$)ELSE V(D1)=V(D1)+VAL(AM
$)
480 NEXTR:CLOSE:IFC1=1THEN610
485 D1=1:C2=99:C3=115
490 CLS:PRINT@39,"TOTAL OF ACCOU
NTS"
495 PRINT@C2,D1$(D1):PRINT@C3,US
INGC$;V(D1):D1=D1+1:C2=C2+32:C3=
C3+32:IFC2>355OR D1>C THEN500ELS
E495
500 C2=99:C3=115:PRINT@421,"TO C
ONTINUE   PRESS SB":PRINT@453,"F
OR MAIN MENU PRESS  M"
505 A$=INKEY$:IFA$=CHR$(32)THEN5
10ELSEIFA$="M"THEN515ELSE505
510 IFD1>C THEN515ELSE490
515 FORD1=1TO C:V(D1)=0:NEXTD1:C
LOSE:GOTO100
520 'TOTAL OF EACH ACCOUNT FOR A
 CERTAN PERIOD
525 CLS:PRINT@37,"TOTAL OF EACH
ACCOUNT":PRINT@70,"FOR A CERTAIN
 PERIOD":PRINT@453,"FOR MAIN MEN
U  ENTER M"
530 PRINT@96:INPUT"STARTING DATE
 OF PERIOD MM/DD/YY";G1$:IFG1$="
"THEN525ELSEIFG1$="M"THEN100ELSE
PRINT:INPUT" ENDING DATE OF PERI
OD MM/DD/YY ";G2$:IFG2$=""THEN52
5ELSEIFG2$="M"THEN100ELSEGOSUB70
535 CLS:PRINT@193,"PROCESSING TO
TALS OF ACCOUNTS":PRINT@228,"FOR
 "G1$" TO "G2$:GOSUB25:D1=1:C=L
540 FOR R=1TOL:GET#1,R:D1$(D1)=C
A$:D1=D1+1:NEXTR:CLOSE:GOSUB30
545 IFL=0THEN100
550 FORR=1TO L:GET#1,R:GOSUB80:F
ORD1=1TO C:IFG3$<=TD$ AND TD$<=G
4$ AND D1$(D1)=AC$THEN555ELSENEX
TD1
555 IFVAL(CN$)>0THEN V(D1)=V(D1)
-VAL(AM$)ELSEV(D1)=V(D1)+VAL(AM$
)
560 NEXTR
565 CLOSE:CLS:PRINT@37,"TOTALS O
F EACH ACCOUNT":PRINT@68,"FOR "G
1$" TO "G2$:PRINT@132,"LIST ON S
CREEN   PRESS A":PRINT@164,"PRIN
T ON PRINTER PRESS B"
570 A$=INKEY$:IFA$="A"THEN575ELS
EIFA$="B"THEN610ELSE570
575 D1=1:C2=99:C3=115
580 CLS:PRINT@34,"TOTALS OF ACCO
UNTS FOR PERIOD"
585 PRINT@C2,D1$(D1):PRINT@C3,US
INGC$;V(D1):D1=D1+1:C2=C2+32:C3=
C3+32:IFC2>355OR D1>C THEN590ELS
E585
590 C2=99:C3=115:PRINT@421,"TO C
ONTINUE  PRESS SB":PRINT@453,"FO
R MAIN MENU PRESS M"
595 A$=INKEY$:IFA$=CHR$(32)THEN6
00ELSEIFA$="M"THEN605ELSE595
600 IFD1>C THEN605ELSE580
605 FORD1=1TO C:V(D1)=0:NEXTD1:C
LOSE:GOTO100
610 CLS:PRINT@37,"READY TO PRINT
 TOTALS":PRINT@99,"DISABLE PRINT
ER AUTOMATIC":PRINT@137,"LINE AD
VANCE":PRINT@197,"WHEN PRINTER I
S READY":PRINT@233,"PRESS  ENTER
"
615 A$=INKEY$:IFA$=CHR$(13)THEN6
20ELSE615
620 IFG1$=""THEN625ELSEPRINT#-2,
TAB(18)"TOTAL OF EACH ACCOUNT FO
R "G1$" TO "G2$CHR$(10)CHR$(10):
GOTO630
625 PRINT#-2,TAB(23)"TOTAL OF EA
CH ACCOUNT FOR ENTIRE FILE"CHR$(
10)CHR$(10)
630 D1=1:D2=2:IFC=1THEN645
635 PRINT#-2,TAB(13)D1$(D1)TAB(2
8):PRINT#-2,USINGC$;V(D1):PRINT#
-2,TAB(45)D1$(D2)TAB(60):PRINT#-
2,USINGC$;V(D2):PRINT#-2,CHR$(10
)
640 D1=D1+2:D2=D2+2:IFC/2=INT(C/
2) AND D1<C THEN635ELSEIFC/2=INT
(C/2) AND D1=C+1 THEN650ELSEIFD1
<(C-1)THEN635ELSE645
645 PRINT#-2,TAB(13)D1$(D1)TAB(2
8):PRINT#-2,USINGC$;V(D1)
650 FORD1=1TO C:V(D1)=0:NEXTD1:G
OTO100
655 'TOTAL OF ONE ACCOUNT FOR EN
TIRE FILE
660 CLS:PRINT@38,"TOTAL OF ONE A
CCOUNT":PRINT@72,"FOR ENTIRE FIL
E":PRINT@453,"FOR MAIN MENU  ENT
ER M":PRINT@96:INPUT"NAME OF ACC
OUNT";D1$:IFD1$=""THEN660ELSEIFD
1$="M"THEN100
665 CLS:PRINT@193,"FIGURING TOTA
L OF "D1$:PRINT@232,"FOR ENTIRE
FILE"
670 D$="           ":D2$=LEFT$(D
1$+D$,11):GOSUB30:V=0:R=1:IFL=0T
HEN CLOSE:GOTO100
675 GET#1,R:IFD2$=AC$ THEN680ELS
ER=R+1:IFR>L THEN685ELSE675
680 GOSUB75:R=R+1:IFR>L THEN685E
LSE675
685 CLS:PRINT@101,"TOTAL OF "D2$
:PRINT@171,USINGC$;V:CLOSE:PRINT
@453,"FOR MAIN MENU  PRESS M"
690 A$=INKEY$:IFA$="M"THEN100ELS
E690
695 'TOTAL OF ONE ACCOUNT FOR A
CERTAIN PERIOD
700 CLS:PRINT@38,"TOTAL OF ONE A
CCOUNT":PRINT@70,"FOR A CERTAIN
PERIOD":PRINT@453,"FOR MAIN MENU
  ENTER M"
705 PRINT@128,"NAME OF ACCOUNT":
INPUTD1$:IFD1$=""THEN700ELSEIFD1
$="M"THEN100
710 PRINT@224,"STARTING TIME  MM
/DD/YY          ":INPUTG1$:IFG1$="
"THEN700ELSEIFG1$="M"THEN100ELSE
PRINT@320,"ENDING TIME  MM/DD/YY
          ":INPUTG2$:IFG2$=""THE
N700ELSEIFG2$="M"THEN100
715 CLS:PRINT@193,"FIGURING TOTA
L OF "D1$:PRINT@228,"FOR "G1$" T
O "G2$
720 GOSUB70:D$="           ":D2$
=LEFT$(D1$+D$,11):GOSUB30:V=0:R=
1
725 GET#1,R:GOSUB80:IFG3$<=TD$ A
ND G4$>=TD$ AND D2$=AC$ THEN730E
LSER=R+1:IFR>L THEN735ELSE725
730 GOSUB75:R=R+1:IFR>L THEN735E
LSE725
735 CLS:PRINT@102,"TOTAL OF "D2$
:PRINT@132,"FOR "G1$" TO "G2$:PR
INT@203,USINGC$;V:CLOSE:PRINT@45
3,"FOR MAIN MENU  PRESS M"
740 A$=INKEY$:IFA$="M"THEN100ELS
E740
900 CLEAR 500:DIMD1$(50):DIMV(50
):C$="$######.##":CC$="$#######.
##":GOTO 10
```

A utility that lets you print straight from the screen

From Screen to Printed Page

by J. A. Ottum



Many computers provide the option of a hard copy of your monitor or TV screen. This comes in handy when you are printing a disk directory on the screen, for example, and you would like to save a copy of it. This utility prints the 32-, 40- or 80-column text screen.

How to Use

To use *Screen Print*, load and run Listing 1. The utility is written in position-independent code and built at the top of free RAM. This area of memory becomes unusable by BASIC.

Joe Ottum is the commanding officer of the Naval Reserve Center in Springfield, Missouri. He has degrees in mathematics and systems management. He has pursued computer systems as a hobby since 1968 and has used a Color Computer since 1981. He can be contacted at 5858 S. Roanoke St., Springfield, MI 65807. Please enclose an SASE when requesting a reply.

Choice of Key

You are asked to enter the desired PRINT SCREEN key. I use the F2 function key to execute this utility. On a CoCo 1 or 2 you might try the @ key or perhaps an up or down arrow. The screen can be printed by either pressing a key or executing the utility from the command line.

After building the program, you are offered the choice of saving, installing or quitting. You must save the program before it is installed. Parts of the utility are overwritten and the execution address is changed after installing. The program is installed the first time you enter an `EXEC`. Subsequent `EXEC`s cause the screen to be sent to the printer. Cassette users should change `SAVEM` to `CSAVEM` in lines 335 and 340.

This utility relies on an input hook, which is referenced during each input and allows user-provided input routines. This hook resides at $016A through $016C and contains the opcode for a `JMP` instruction. After the installation of *Screen Print* , this jump is redirected to the *Screen Print* utility. After the utility has a chance to print the screen, computer control is vectored back to the address originally stored at the input hook.

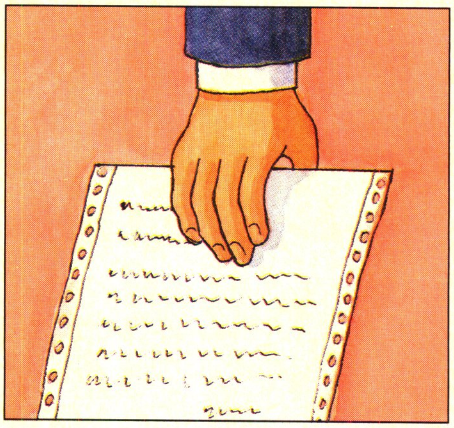
The keyboard rollover table is used to determine if the PRINT SCREEN key has been pressed. To watch this table in action, run the following short program:

```
10 PRINT @0:FOR X=338 TO 345:PRI
 NT X,PEEK(X):NEXT:GOTO 10
```

Press various keys and see the results. The problem with using these unreferenced hooks and tables is that they may be altered by future versions of the CoCo. These have worked for me on my 1981-vintage gray CoCo 1 and also my CoCo 3.

Program Memory

If you are using a CoCo 3, make sure the program is not installed between $0000 and $5FFF. When printing a 40- or 80-column text screen, the utility alters the memory map. The high-resolution text screen resides in this area of memory. After printing, the memory map is restored. For information on how to do this, refer to the Color Computer Service Manual.



Screen Width

To determine what size screen you are using, Address $00E7 is referenced. On the CoCo 1 this address is used for the input timeout constant. However, on the CoCo 3 it contains a 0 for 32 columns, a 1 for 40 columns, or a 2 for 80 columns. The utility tests for a 1 or 2 to determine screen width. If any other number is stored here, a 32-column text screen is assumed. If you use this utility on a CoCo 1 or 2 and have trouble, try POKE &HE7,5. ☐

16K Extended

Editor's Note: Since the source code in Listing 2, PRTASM, is presented for reference purposes, no object file is on this month's RAINBOW ON TAPE/DISK. Also, this source code is provided only on the RAINBOW ON DISK.

☑
85 5
170 65
255 222
350 71
375 203
END 96

Listing 1: PRT

```
0 'COPYRIGHT 1989, FALSOFT INC.
5 CLS
10 CLEAR 500,PEEK(39)*256+PEEK(4
0)-&HD9
15 S=PEEK(39)*256+PEEK(40)+1
20 'DO NOT USE &H4000-&H5FFF
25 IF S > &H5FFF OR S+&HD9 < &H4
000 THEN 40
30 CLEAR 500,&H3F25
35 S=&H3F26
40 DIM RT(7,6)
45 'EXEC ADDRESS
50 E=S+&H81
55 A=INT(E/256)
60 POKE 157,A
65 POKE 158,E-A*256
70 PRINT " BUILDING PRINT SCREEN
"
75 PRINT
80 PRINT " START ADDRESS ";S
85 PRINT "   END ADDRESS ";S+&HD
9
90 PRINT "  EXEC ADDRESS ";E
95 FOR X=S TO S+&HD9
100 READ A$
105 POKE X,VAL("&H"+A$)
110 NEXT X
115 'DEFAULT: FUNCTION KEY F2
120 PRINT
125 PRINT "ENTER DESIRED KEY"
130 Q$=INKEY$:IF Q$="" THEN 130
ELSE Q=ASC(Q$)
135 IF Q=4 THEN 245
140 'READ KEYBOARD ROLLOVER TABL
E
145 FOR B=0 TO 6
150 FOR A=0 TO 7
155 READ A$
160 RT(A,B)=VAL("&H"+A$)
165 NEXT A,B
170 FOR A=0 TO 7
175 FOR B=0 TO 6
180 IF RT(A,B)= Q THEN 205
185 NEXT B,A
190 PRINT
195 PRINT "SORRY, CAN NOT USE ";
Q$
200 GOTO 120
205 A=A+82
210 FOR X=0 TO B
215 READ V$
220 V=VAL("&H"+V$)
225 NEXT X
230 POKE S+8,A
235 POKE S+10,V
240 POKE S+17,A
245 CLS
250 PRINT " PRINT SCREEN"
255 PRINT
260 PRINT
265 PRINT " <I>NSTALL AND QUIT"
270 PRINT " <S>AVE"
275 PRINT " <Q>UIT"
280 PRINT
285 PRINT " SAVE BEFORE INSTALLI
NG"
290 Q$=INKEY$:IF Q$="" THEN 290
295 IF Q$="Q" THEN 315
300 IF Q$="S" THEN 320
305 IF Q$<>"I" THEN 245
310 EXEC
315 END
320 PRINT
325 INPUT " FILE NAME";F$
330 PRINT
335 PRINT "SAVEM ";F$;",";S;",";
S+&HD9;",";E
340 SAVEM F$,S,S+&HD9,E
345 GOTO 245
350 '
355 'MACHINE LANGUAGE PROGRAM
360 DATA 34,36,6F,8D,00,8E,B6,01
,58,81,BF,26,71,86,FF,B7,01,58,8
6,FE,97,6F,96,E7,4A,27,3C,4A,27,
77,8E,04,00,A6,80,27,1C,81,80,24
,18,81,1B,24,04,8B,60,20,12,81,4
0,2D,0C,81
365 DATA 5E,2D,0A,81,60,2D,04,80
,40,20,02,86,20,AD,9F,A0,02,1F,1
0,58,58,58,26,02,8D,66,8C,06,00,
26,CC,20,1A,8D,53,A6,81,8D,61,AD
,9F,A0,02,C1,28,26,02,8D,4F,8C,4
7,80,26,ED
370 DATA 86,3A,B7,FF,A2,86,0C,AD
,9F,A0,02,A6,8D,00,19,27,01,39,3
5,36,7E,BE,01,6B,AF,8C,FA,30,8D,
FF,75,BF,01,6B,30,8D,00,3A,9F,9D
,39,8D,15,A6,81,8D,23,AD,9F,A0,0
2,C1,50,26
375 DATA 02,8D,11,8C,4F,00,26,ED
,20,C0,86,36,B7,FF,A2,8E,40,00,5
F,39,86,0D,AD,9F,A0,02,5F,39,81,
80,23,02,80,80,81,20,2C,02,86,20
,5C,39,34,36,86,FF,A7,8D,FF,C0,1
7,FF,3B,35,36,39
380 '
385 'KEYBOARD ROLLOVER TABLE
390 DATA 40,41,42,43,44,45,46,47
395 DATA 48,49,4A,4B,4C,4D,4E,4F
400 DATA 50,51,52,53,54,55,56,57
405 DATA 58,59,5A,5E,0A,08,09,20
410 DATA 30,31,32,33,34,35,36,37
415 DATA 38,39,3A,3B,2C,2D,2E,2F
420 DATA 0D,0C,00,40,BD,67,04,00
425 '
430 'ROLLOVER TABLE VALUES
435 DATA FE,FD,FB,F7,EF,DF,BF
```

Listing 2: PRTASM

```
00100
00110 **********************************
00120 *.........Name:...PRT.........
00130
00140 *postion.independent.code.
00150
00160 *after.installing.either
00170 *function.key.<F2>.or
00180 *<EXEC>.prints.screen
00190
00200 *do.not.change.org.to.$4000-5FFF
00210 *the.40.or.80.width.screens.are
00220 *copied.to.this.memory.area
00230
00240 *exec.address.changes.from.<start>
00250 *to.<dir>.after.1st.execution
00260
00270 *parts.of.<install>.written
00280 *over.after.1st.execution.
00290
00300 **********************************
00310         ORG     $7000
00320
00330 **********************************
00340 *.........definitions..........
00350
00360 *device.number
00370 DEVNUM  EQU     $6F
00380
00390 *ml.exec.address
00400 EXEC    EQU     $9D
00410
00420 *type.screen
00430 TYPE    EQU     $E7
00440
00450 *rollover.table
00460 ROLL    EQU     $158
00470
00480 *input.driver
00490 INPT    EQU     $16B
00500
00510 *character.out
00520 CHROUT  EQU     $A002
00530
00540 *MMU.location.address
00550 MMU     EQU     $FFA2
00560
00570 **********************************
00580 *.........main.program.........
00590 PRT     PSHS    Y,X,B,A
00600         CLR     TEST,PCR
00610
00620 *poll.keyboard.table.for.<F2>
00630         LDA     ROLL
00640         CMPA    #$BF
00650         BNE     FIN
00660
00670 *clear.keyboard.rollover.table
00680         LDA     #$FF
00690         STA     ROLL
00700
00710 *prepare printer
00720 PT1     LDA     #$FE
00730         STA     DEVNUM
00740
00750 *type.screen
00760         LDA     TYPE
00770         DECA
00780         BEQ     MEDRES
00790         DECA
00800         BEQ     HIRES
00810
00820 **********************************
00830 *........32.width.screen.........
```

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```
00840         LDX     #$400
00850 LR1     LDA     ,X+
00860
00870 *convert.screen.character.to.ASCII
00880         BEQ     LR3
00890         CMPA    #$80
00900         BCC     LR3
00910         CMPA    #$1B
00920         BCC     LR2
00930         ADDA    #$60
00940         BRA     LR4
00950 LR2     CMPA    #$40
00960         BLT     LR3
00970         CMPA    #$5E
00980         BLT     LR4
00990         CMPA    #$60
01000         BLT     LR3
01010         SUBA    #$40
01020         BRA     LR4
01030 LR3     LDA     #$20
01040 LR4     JSR     [CHROUT]
01050
01060 *check.for.end.of.line
01070         TFR     X,D
01080         LSLB
01090         LSLB
01100         LSLB
01110         BNE     LR5
01120         BSR     CR
01130
01140 *done?
01150 LR5     CMPX    #$600
01160         BNE     LR1
01170         BRA     CL1
01180
01190 ********************************
01200 *........40.width.screen........
01210 MEDRES  BSR     IN
01220
01230 ME1     LDA     ,X++
01240         BSR     CV
01250         JSR     [CHROUT]
01260
01270 *check.for.end.of.line
01280         CMPB    #$28
01290         BNE     ME2
01300         BSR     CR
01310
01320 *done?
01330 ME2     CMPX    #$4780
01340         BNE     ME1
01350
01360 ********************************
01370 *.......cleanup.and.end.........
01380 CL      LDA     #$3A
01390         STA     MMU
01400
01410 CL1     LDA     #$0C
01420         JSR     [CHROUT]
01430
01440 *test.for.direct.exec
01450         LDA     TEST,PCR
01460         BEQ     FIN
01470         RTS
01480
01490 FIN     PULS    A,B,X,Y
01500
01510 *program.exit.
01520 RTN     FCB     $7E     JUMP
01530 ********************************
01540 *........install.program........
01550
01560 START   LDX     INPT
01570         STX     1+RTN,PCR
01580
01590         LEAX    PRT,PCR
```

```
01600          STX      INPT
01610
01620          LEAX     DIR,PCR
01630          STX      EXEC
01640
01650 TEST     RTS
01660
01670 ***********************************
01680 *........80.width.screen.........
01690 HIRES    BSR      IN
01700
01710 HR1      LDA      ,X++
01720          BSR      CV
01730          JSR      [CHROUT]
01740
01750 *check.for.end.of.line
01760          CMPB     #$50
01770          BNE      HR2
01780          BSR      CR
01790
01800 *done?
01810 HR2      CMPX     #$4F00
01820          BNE      HR1
01830          BRA      CL
01840
01850 ***********************************
01860 *...move.high.resolution.screen..
01870 IN       LDA      #$36
01880          STA      MMU
01890
01900          LDX      #$4000
01910          CLRB
01920          RTS
01930
01940 ***********************************
01950 *.........end.of.line...........
```

```
01960 CR       LDA      #$0D
01970          JSR      [CHROUT]
01980          CLRB
01990          RTS
02000
02010 ***********************************
02020 *....convert.hi&med.res.chars....
02030 CV       CMPA     #$80
02040          BLS      CV1
02050          SUBA     #$80
02060 CV1      CMPA     #$20
02070          BGE      CV2
02080          LDA      #$20
02090 CV2      INCB
02100          RTS
02110
02120 ***********************************
02130 *..........direct.exec..........
02140 DIR      PSHS     Y,X,B,A
02150
02160 *set.variable
02170          LDA      #$FF
02180          STA      TEST,PCR
02190
02200 *print.screen
02210          LBSR     PT1
02220
02230 *exit
02240          PULS     A,B,X,Y
02250          RTS
02260
02270 ***********************************
02280
02290          END      START
02300
02310 ***********************************
```

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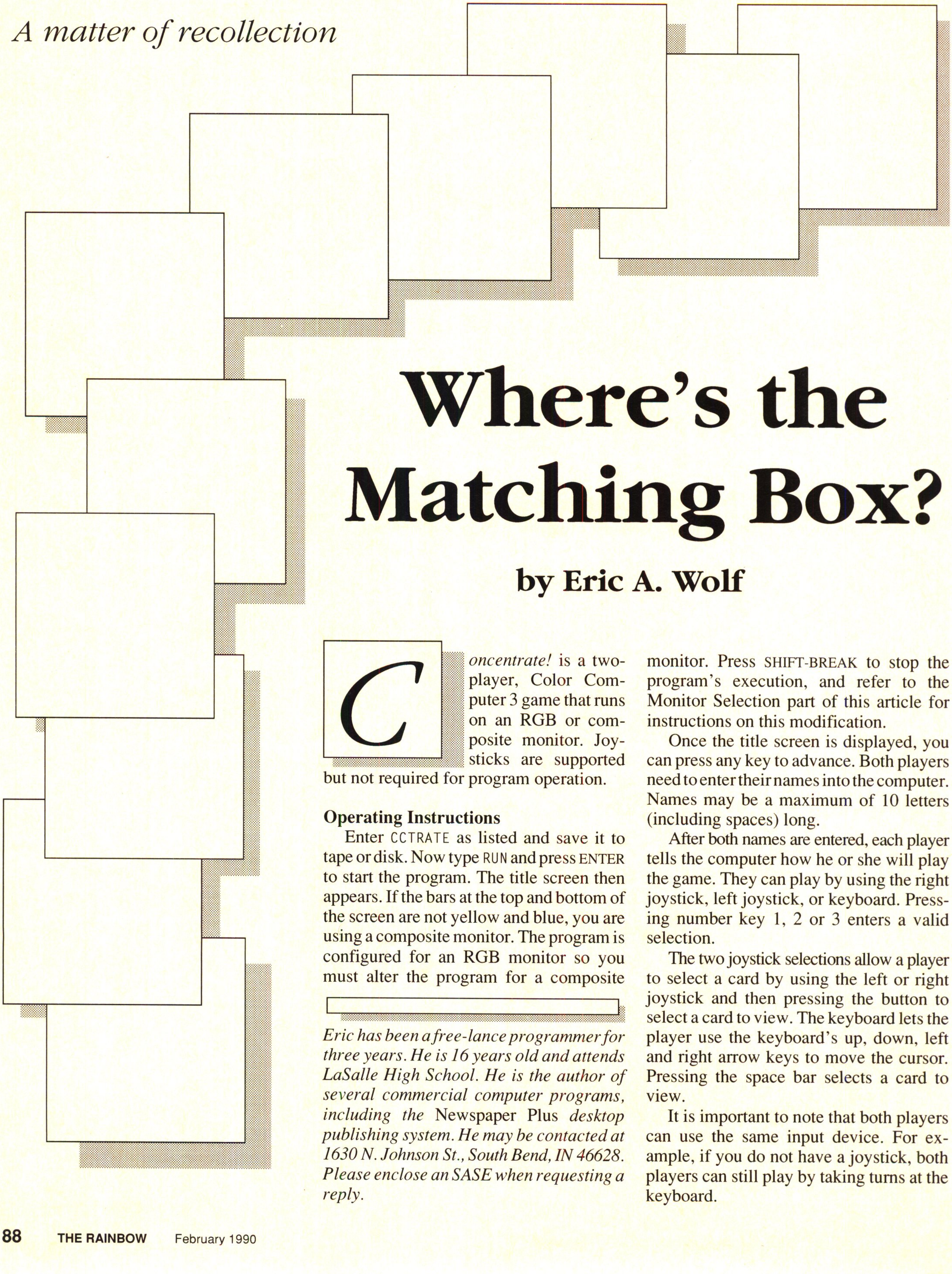

Where's the Matching Box?

by Eric A. Wolf

Concentrate! is a two-player, Color Computer 3 game that runs on an RGB or composite monitor. Joysticks are supported but not required for program operation.

Operating Instructions

Enter CCTRATE as listed and save it to tape or disk. Now type RUN and press ENTER to start the program. The title screen then appears. If the bars at the top and bottom of the screen are not yellow and blue, you are using a composite monitor. The program is configured for an RGB monitor so you must alter the program for a composite monitor. Press SHIFT-BREAK to stop the program's execution, and refer to the Monitor Selection part of this article for instructions on this modification.

Eric has been a free-lance programmer for three years. He is 16 years old and attends LaSalle High School. He is the author of several commercial computer programs, including the Newspaper Plus *desktop publishing system. He may be contacted at 1630 N. Johnson St., South Bend, IN 46628. Please enclose an SASE when requesting a reply.*

Once the title screen is displayed, you can press any key to advance. Both players need to enter their names into the computer. Names may be a maximum of 10 letters (including spaces) long.

After both names are entered, each player tells the computer how he or she will play the game. They can play by using the right joystick, left joystick, or keyboard. Pressing number key 1, 2 or 3 enters a valid selection.

The two joystick selections allow a player to select a card by using the left or right joystick and then pressing the button to select a card to view. The keyboard lets the player use the keyboard's up, down, left and right arrow keys to move the cursor. Pressing the space bar selects a card to view.

It is important to note that both players can use the same input device. For example, if you do not have a joystick, both players can still play by taking turns at the keyboard.

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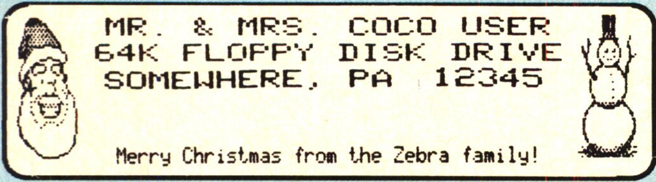

```
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```

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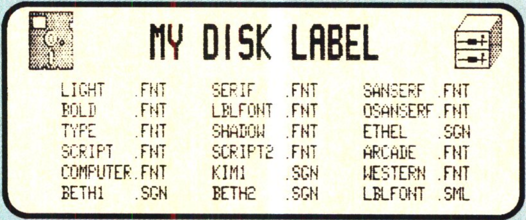

```
                MY DISK LABEL

LIGHT   .FNT   SERIF   .FNT   SANSERF .FNT
BOLD    .FNT   LBLFONT .FNT   OSANSERF.FNT
TYPE    .FNT   SHADOW  .FNT   ETHEL   .SGN
SCRIPT  .FNT   SCRIPT2 .FNT   ARCADE  .FNT
COMPUTER.FNT   KIM1    .SGN   WESTERN .FNT
BETH1   .SGN   BETH2   .SGN   LBLFONT .SML
```

LABEL DESIGNER LABEL
PRINTED ON DMP105
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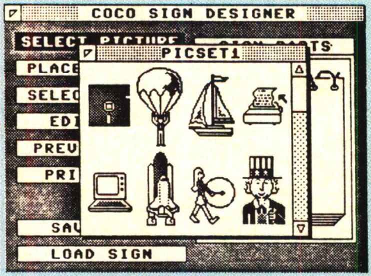

Picture Selection Screen

Requirements: CoCo II 64K or CoCo III, disk drive, RSDOS, joystick or mouse. Printers supported include: Epson RX/FX/LX, Gemini 10X, SG10, NX10, NX1000, DMP105/106/110/120/130/132/200/400, Panasonic KXP1080 / 90 /91/92, Prowriter, C.Itoh 8510, Okidata 92/93/182/183 & more.

Label Designer & CGDP

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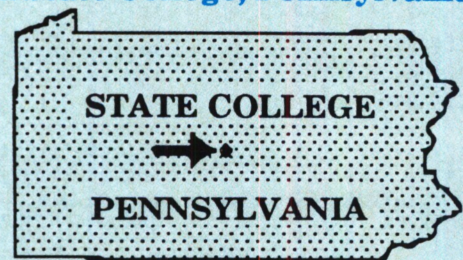

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Game Play

The game board appears, signifying that the game has begun. Each player takes turns moving a cursor and selecting a card, which then turns over and shows a picture. The object of the game is to find another card with the same picture as the first one you turned over.

Always remember to be careful when accessing memory outside BASIC. If not handled properly, memory modifications can end up crashing the computer and destroying any program you have entered into it.

If you are successful in finding a match, those two cards are removed from the screen, your score goes up, and you get an additional turn. If you are not successful in finding a match, both cards are turned face down again and the other player has a turn.

The game continues until all the cards have been removed. At that time a scoreboard appears showing the number of pairs of cards each player collected and the winner. From the title screen you are asked if you want to play another game. If you want to play again, press Y. If you do not, press N and you are returned to BASIC. If you get an error running the program a second time, type `RUN` again.

Monitor Selection

You need to tell the program what type of monitor you are using by altering Line 70 of the program. Setting Variable `MO` to equal 1 signifies that you are using an RGB monitor. A value of 0 specifies that you are either using a color TV or a composite monitor.

Note to Advanced Programmers

Advanced programmers may want to look at the program to investigate how I managed to achieve two `HGET`/`HPUT` buffer areas. As you may already know, BASIC allocates a single 8K block of memory to be used with `HGET`/`HPUT` graphics storage and retrieval. My program, however, tricks BASIC and takes advantage of using 16K for graphics storage. If you are interested in finding out how to do this for yourself (and possibly exceeding my 16K area), investigate the graphics initialization part of the program (lines 235 through 295) and the card flipping/card display routines (lines 600 through 605).

If you need more help, here are a couple of hints: Each 8K storage buffer must first be initialized by placing two $FF (255) bytes at the beginning of the buffer even before an `HBUFF` is executed on it. Also, Location $E0D4 tells Super Extended Color BASIC which 8K block holds the `HGET`/`HPUT` buffer. Changing this allows you to access multiple 8K areas.

Always remember to be careful when accessing memory outside BASIC. If not handled properly, memory modifications can end up crashing the computer and destroying any program you have entered into it. These advanced procedures are recommended only for those programmers who are familiar with the Memory Management Unit (MMU) and the GIME and have a good understanding of programming in BASIC. ❑

CoCo 3

95	244
125	174
160	115
220	186
260	74
300	215
350	126
390	233
430	188
465	201
525	125
570	55
610	218
640	68
660	226
END	237

The Listing: `CCTRATE`

```
0 'COPYRIGHT 1989, FALSOFT INC.
10 '==============================
15 '  C O N C E N T R A T E !
20 '
25 '  Written By Eric A. Wolf
30 '     Copyright (C) 1989
35 '==============================
40 POKE65497,0:PCLEAR1:WIDTH32
45 CLEAR1000:DIM B(10,5),C(16)
50 HSCREEN2:HSCREEN0
55 POKE&HA27E,0
60 '
65 ' Set monitor type HERE!
70 '
75 MO=1  '(1=RGB and 0=CMP/TV)
80 '
85 ' Display Title Screen
90 '
95 A1$="":A2$="":FORZ=1TO8:A1$=A
1$+CHR$(159)+CHR$(159)+CHR$(175)
+CHR$(175):A2$=A2$+CHR$(175)+CHR
$(175)+CHR$(159)+CHR$(159):NEXTZ
100 IF MO=1 THEN RGB ELSE CMP
105 WIDTH32:POKE359,57:POKE&HFF2
2,80
110 PRINT@0,A1$:PRINT@260,"Writt
en By Eric A. Wolf":PRINT@294,"C
opyright (C) 1989":PRINT@448,A1$
;
115 PLAY"T200L200":T$="CONCENTRA
TE!":FORY=1 TO 12:FORX=64 TO 160
 STEP 32:POKE1026+(Y*2)+X-32,96:
PRINT@2+(Y*2)+X,MID$(T$,Y,1):PLA
YSTR$(Y):NEXTX:FORZ=1TO50:NEXTZ,
Y
120 FORY=6TO12:FORX=Y TO 12:PLAY
 STR$(X):NEXTX,Y
125 FORY=0TO2:PRINT@384,STRING$(
31,32);:POKE1439,96:FORZ=1TO200:
NEXTZ:PRINT@384,"< Press any key
 to begin game!";:POKE1439,126:F
ORZ=1TO200:NEXTZ,Y:R=1
130 D=20:IF R=1 THEN PRINT@0,A1$
;:PRINT@448,A1$;: ELSE PRINT@0,A
2$;:PRINT@448,A2$;
135 R=1-R
140 D=D-1:IF D=0 THEN 130
145 A$=INKEY$:IFA$=""THEN140 ELS
E FORY=1TO16:PRINT@480:FORZ=1TO5
0:NEXTZ,Y
150 PRINT@32,"Will the first pla
yer please    enter their name b
elow...":I=128:GOSUB175:N$(0)=N$
155 PRINT@192,"Thank you.  Now,
will the secondplayer enter thei
r name.":I=288:GOSUB175:N$(1)=N$
160 CLS:A$="Welcome "+N$(0)+" &
"+N$(1):PRINT@16-LEN(A$)/2,A$:PR
INT@34,"to the game of CONCENTRA
TE !":PRINTSTRING$(32,"=")
165 P=0:GOSUB180:P=1:GOSUB180
170 GOTO 200
175 PRINT@I,"";:LINEINPUTN$:N$=L
EFT$(N$,10):RETURN
180 FORY=96TO448STEP32:PRINT@Y,S
TRING$(32,32);:NEXTY:PRINT@128,N
$(P);", please select your":PRIN
T@160,"method of input...":PRINT
185 PRINT"1) Right Joystick":PRI
NT"2) Left Joystick":PRINT"3) Ke
yboard"
190 A$=INKEY$:IFA$<"1"ORA$>"3"TH
EN190ELSEP(P)=VAL(A$)-1
195 RETURN
200 CLS:PRINT@266,"Please wait..
."
205 '
210 ' Select correct palettes
215 '
220 IF MO=1 THEN PA$="0009566307
5200326040542518345636" ELSE PA$
="001132631653000756263645182132
07"
225 '
230 ' Store Flip Card Animation
```

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```
235 '
240 POKE&HE6,2:LPOKE &H6E000,&HF
F:LPOKE&H6E001,&HFF:POKE&HE0D4,&
H37:FORY=1TO17:HBUFFY,455:NEXTY
245 POKE&HE0D4,&H34:FORY=1TO17:H
BUFFY,455:NEXTY
250 BL=0:FOR L=0 TO 15 STEP 4:FO
RY=0TO29STEP2:HSET(Y,0,1):HSET(Y
+1,1,1):HSET(Y+1,0,2):HSET(Y,1,2
):NEXTY:HGET(0,0)-(29,1),BL+1:FO
RY=2TO29 STEP2:HPUT(0,Y)-(29,Y+1
),BL+1,PSET:NEXT
255 GOSUB265:BL=BL+1:HGET(0,0)-(
29,29),BL:NEXTL
260 FORL=12 TO 0 STEP-4:HCOLOR3:
HLINE(0,0)-(29,29),PSET,BF:GOSUB
265:BL=BL+1:HGET(0,0)-(29,29),BL
:NEXTL:GOTO295
265 IFL=0 THEN 275
270 FORL1=0 TO L-1:HLINE(0,L1)-(
29,L1),PRESET:HLINE(0,29-L1)-(29
,29-L1),PRESET:NEXTL1
275 HDRAW"C0;BM0,"+STR$(L)+";ND1
R1;BM0,"+STR$(29-L)+";NU1R1;BM29
,"+STR$(L)+";ND1L1;BM29,"+STR$(2
9-L)+";NLU1U1":RETURN
280 '
285 ' Store 16 Card Faces
290 '
295 HCLS:POKE&HE0D4,&H34:HPUT(0,
0)-(29,29),1,PSET:POKE&HE0D4,&H3
7:HGET(0,0)-(29,29),1
300 BL=1:FORY=1TO16:POKE&HE0D4,&
H34:HPUT(0,0)-(29,29),8,PSET:POK
E &HE0D4,&H37:READ D1$,D2$,P1,P2
:HDRAW D1$:HPAINT(P1,P2):HDRAW D
2$:BL=BL+1:HGET(0,0)-(29,29),BL:
NEXTY
305 '
310 ' Start the game!
315 '
320 GOSUB485:P=1:TF=0:S(0)=0:S(1
)=0
325 SW=0:P=1-P:HLINE(0,176)-(319
,191),PRESET,BF:A$=N$(P)+", use
"
330 IF P(P)=0 THEN A$=A$+"right
joystick" ELSE IF P(P)=1 THEN A$
=A$+"left joystick" ELSE A$=A$+"
Keyboard"
335 A$=A$+" to select":HCOLOR2:H
PRINT(20-LEN(A$)/2,23),A$
340 B=0:O1=-1:O2=-1:X1=4:Y1=2
345 ON P(P)+1 GOTO 350,355,360
350 B=PEEK(65280) AND 1:B=1-B:X1
=JOYSTK(0)/7:Y1=JOYSTK(1)/12.8:G
OTO390
355 B=PEEK(65280) AND 2:B=(B/2)*
1:B=1-B:X1=JOYSTK(0):X1=JOYSTK(2
)/7:Y1=JOYSTK(3)/12.8:GOTO390
360 IF O1<0 THEN 390 ELSE A$=INK
EY$
365 B=0:IF A$=" " THEN B=1
370 X1=X1-11:Y1=Y1-11:X1=INT(O1/
32):Y1=INT(O2/32):IF A$=CHR$(8)
THEN X1=X1-1:IFX1<0 THEN X1=0
375 IFA$=CHR$(9)THENX1=X1+1:IFX1
>9THENX1=9
380 IFA$=CHR$(94)THENY1=Y1-1:IFY
1<0 THEN Y1=0
385 IFA$=CHR$(10)THENY1=Y1+1:IFY
1>4 THEN Y1=4
390 X1=INT(X1)*32+11:Y1=INT(Y1)*
32+11:IF X1=O1 THEN IF Y1=O2 THE
N 405
395 POKE&HE0D4,&H34:IF O1>-1 THE
N HPUT(O1,O2)-(O1+7,O2+7),9,PSET
400 O1=X1:O2=Y1:HGET(X1,Y1)-(X1+
7,Y1+7),9:HCOLOR2:HLINE(X1,Y1)-(
X1+7,Y1+7),PSET,BF
405 IF B=0 THEN 345
410 X=X1-11:Y=Y1-11:X=INT(X/32)+
1:Y=INT(Y/32)+1
415 IF B(X,Y)=0 THEN 345
420 SW=SW+1:IF SW=1 THEN C1=X:C2
=Y:GOSUB605:GOTO340
425 IF C1=X AND C2=Y THEN SW=SW-
1:GOTO340 ELSE C3=X:C4=Y
430 GOSUB605:IF B(C1,C2)<>B(C3,C
4) THEN HLINE(0,176)-(319,183),P
RESET,BF:HCOLOR15:HPRINT(7,22),"
Sorry, no match that time!":PLAY
"T150L150":FORY=12TO1STEP-1:PLAY
 STR$(Y):NEXTY:FORZ=1TO100:NEXTZ
:X=C1:Y=C2:GOSUB610:X=C3:Y=C4:GO
SUB610:GOTO325
435 C1=C1-1:C2=C2-1:C3=C3-1:C4=C
4-1
440 PLAY"T200L200":HCOLOR3:HPRIN
T(7,22),"Great Match!   Keep goi
ng!"
445 FORZ1=1 TO 12 STEP3:FORZ=Z1
TO 12:PLAY STR$(Z):NEXTZ,Z1:HLIN
E(C1*32,C2*32)-(C1*32+30,C2*32+3
0),PRESET,BF:HLINE(C3*32,C4*32)-
(C3*32+30,C4*32+30),PRESET,BF
450 S(P)=S(P)+1:B(C1+1,C2+1)=0:B
(C3+1,C4+1)=0:SW=0:HLINE(160,160
)-(176,167),PRESET,BF:HLINE(304,
160)-(319,167),PRESET,BF:HPRINT(
19,20),S(0):HPRINT(37,20),S(1)
455 TF=TF+1:IF TF<25 THEN 340
460 IF S(0)>S(1) THEN W=0 ELSE W
=1
465 GOTO560
470 '
475 ' Make & Draw a new board
480 '
485 FORY=1TO16:PALETTE Y-1,VAL(M
ID$(PA$,(Y-1)*2+1,2)):NEXTY
490 HSCREEN2:HCOLOR2:HPRINT(11,1
2),"Shuffling Cards...":TC=0
495 FORY=0TO15:C(Y)=0:NEXTY
500 F=RND(16):IF C(F-1)>0 THEN 5
00 ELSE C(F-1)=1
505 X=RND(10):Y=RND(5):IF B(X,Y)
>0 THEN 505 ELSE B(X,Y)=F
510 X=RND(10):Y=RND(5):IF B(X,Y)
>0 THEN 510 ELSE B(X,Y)=F
515 TC=TC+1:IF TC=16 THEN FORW=0
TO15:C(W)=0:NEXTW
520 IF TC<25 THEN 500
525 HLINE(88,96)-(258,103),PRESE
T,BF:POKE&HE0D4,&H37:FORY=0TO4:F
ORX=0TO9:HPUT(X*32,Y*32)-(X*32+2
9,Y*32+29),1,PSET:NEXTX,Y
530 HCOLOR10:HPRINT(36,20),"-":H
PRINT(18,20),"-":HPRINT(0,20),"S
core:"
535 HCOLOR0:HPRINT(0,23),N$(0):H
COLOR10:HPRINT(7,20),N$(0):HPRIN
T(25,20),N$(1)
540 RETURN
545 '
550 ' We have a winner!
555 '
560 PLAY"T200L200":FORY=1TO12:FO
RX=Y TO12:PLAY STR$(X):NEXTX,Y:H
SCREEN0:IF MO=1 THEN RGB ELSE CM
P
565 HSCREEN0:CLS:PRINT@39,"We ha
ve a winner !":PRINT@138,"Final
Score":PRINT@170,STRING$(11,"-")
570 PRINT@202,N$(0):PRINT@214,S(
0):PRINT@234,N$(1):PRINT@246,S(1
)
575 PRINT:PRINT:A$=N$(W)+" is ou
r winner!":PRINTTAB(16-LEN(A$)/2
);A$
580 PRINT@483,"Care to play agai
n (Y/N) ?";
585 A$=INKEY$:IFA$="N" THEN POKE
359,126:RGB:END ELSE IFA$="Y"THE
NRUN ELSE 585
590 '
595 ' Flip a specific card
600 '
605 X1=(X-1)*32:Y1=(Y-1)*32:PLAY
"T20L20":POKE&HE0D4,&H34:FORZ=1T
O8:HPUT(X1,Y1)-(X1+29,Y1+29),Z,P
SET:PLAY STR$(Z):FORZ1=1TO50:NEX
TZ1,Z:POKE&HE0D4,&H37:HPUT(X1,Y1
)-(X1+29,Y1+29),B(X,Y)+1:RETURN
610 X1=(X-1)*32:Y1=(Y-1)*32:PLAY
"T20L20":POKE&HE0D4,&H34:FORZ=7
TO 1 STEP-1:HPUT(X1,Y1)-(X1+29,Y
1+29),Z,PSET:PLAY STR$(Z):FORZ1=
1TO50:NEXTZ1,Z:RETURN
615 '
620 ' Card Face Grfx Data
625 '
630 DATA "BM13,7;C15;E3R5F3D6G10
H10U6E3R5F3","",15,15,"BM14,4;C1
4;G10F10E10H10","",14,14,"BM12,8
;C13;D16RU16RD16RU16;BM14,2;C12;
M+12,+19;L24;M+12,-19;","",14,15
635 DATA "BM15,13;C13;L12R24H1L2
2ER20HL18ER16HL14ER12HL10ER8HL6;
BM15,26;C11;R12U12L24D12R12L2U6R
4D6;L1;C13;U5LD5LU5;BM6,4;D6RU6R
D6;C11","",15,15
640 DATA "BM15,4;C10;R6F6D10G6L1
2H6U10E6R12;BM9,8;D5R3U5L2D1;C0;
D3RU3;BM18,8;C10;D5R3U5L2D1;C0;D
3RU3;C10;BM5,17;R2F4R8E4R2G6L8H6
R2;D1;C0;F4R8E4;C10","",15,15
645 DATA "BM3,4;C1;M+8,+20;R16;M
-8,-20;L16","",8,5,"BM2,18;C9;R2
4U4;M-2,-4;H2;M-4,-2;L8;M-4,+2;G
2;M-2,+4;D4;","",15,15
650 DATA "C8;BM9,4;D24R4;M+4,-2;
E4;M+2,-4;U6;M-2,-4;H4;M-4,-2;L4
D2;","",15,15,"C13;BM3,4;R22D6H2
L6D16L6U16L6G2U6;","",15,15
655 DATA "C7;BM4,3;R22D5L18D4R18
D5L18D4R18D5L22U23;","",6,6,"C0;
BM10,5;D16GL3HU3ER3FU11R12UL12UR
12D16GL3HU3ER3FL4DR4DL4DR4","C3;
BM6,19;E1;BM18,19;E1",8,20
660 DATA "C2;BM4,4D20RU20R1;C15;
R20DL20BD2R20DL20BD2R20DL20BD2R2
0DL20;BM6,4;C1;D5RU5RD5RU5RD5RU5
;C0","",0,0
665 DATA "BM4,4;C0;R22D22L22U22"
,"C3;BM26,7;LDR1;BM15,15;NL2NR2U
1NL2NR2U1NL1NR1D3NR2NL2D1NL1R1;B
D2;BL1D6EU4L2D4",15,15
670 DATA "C0;BM3,4;D20RU20RD20RU
20RD20RU20RD20RU20R1;C4;D20RU20R
D20RU20RD20RU20RD20RU20R1;C14;D2
0RU20RD20RU20RD20RU20RD20RU20;C0
","",0,0
675 DATA "C9;BM3,5;E3R18F3D21H3G
3H3G3H3G3H3G3U21;","C8;BM8,11;R4
EL6UR6UL6ER4;C10;L1GR3DL3DNR3FR1
;C8;BM18,11;R4EL6UR6UL6ER4;C10;L
1GR3DL3DNR3FR1",8,8
680 DATA "C5;BM4,4;D22R22H22",""
,6,16
685 '
690 END
```

CORRECTIONS

"One Tile at a Time"(January 1990, Page 72): In the second column, Line 1170 was accidently appended to the end of Line 1160. The two lines shown should read:

```
1160 IFBO=2THENBO=0:GOTO1180ELSE
FORIX=23TO250STEP34:FORIY=40TO17
0STEP20:HPUT(IX+1,IY)-(IX+33,IY+
20),17,PSET:NEXTIY,IX
1170 HCOLOR1:HLINE(23,40)-(23,18
0),PSET:HGET(24,41)-(56,59),13
```

"Peg Me"(December 1989, Page 27): An incorrect address for George Quellhorst was printed. His new address is 63 South State St., Apt. 10, Painesville, OH 44077; (216) 354-5733.

"High Capacity Screen Dumps for the Shoestring Desktop Publisher"(August 1989, Page 38): The line shown at the top of the second paragraph on Page 39 has a parenthesis missing. The line should read:

```
THENCLS:PRINT#-2,CHR$(27);CHR$(2
0);:EXEC&H132A
```

"Pixel Pictures"(January 1989, Page 28): Lines 260 and 280 were incorrectly printed, and the author has recently moved. His new address is Bill Bernico, 16721 Lakeshore Road, Cleveland, WI 53015. The two incorrect lines should read:

```
260 IF I$="R"THENX$=INKEY$:IFX$=
"Y"THEN20ELSEIFX$="N"THENHCOLOR8
:HPRINT(23,23),"RESTART?? (Y/N)"
:GOSUB490:GOTO80ELSE260
280 IF I$="Q"THENX$=INKEY$:IFX$=
"Y"THEN330ELSEIFX$="N"THENHCOLOR
8:HPRINT(23,21),"QUIT??  (Y/N)":G
OSUB490:GOTO80ELSE280
```

"*CycleJump* — Breezy Rider"(Review, January 1990, Page 104): J.T. Rawlinson Software's telephone number is listed incorrectly. The correct number is (416) 782-2217. Also, the price should be listed as $12.95 plus $2 S/H.

"PRINT#-2"(January 1990, Page 10): Because of an editorial oversight, Lonnie's column incorrectly implies a discount of $13.50 off the price of our upcoming book, *CoCo: An Affectionate History*. The correct discount is $2.45. This makes the pre-publication price of the book $13.50. We apologize for any inconvenience this may have caused.

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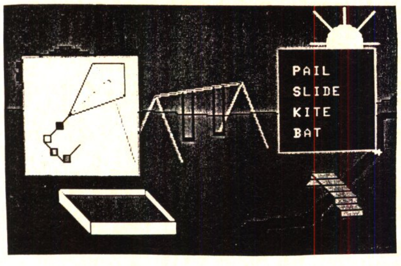

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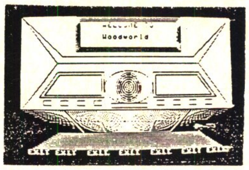

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One-On-One Math Drills

by Steve Blyn
Contributing Editor

This month's article presents a blueprint for an educational basketball drill. I have chosen to use this game for math practice, although almost any subject that requires drill and practice is suitable for use with this blueprint program.

The object of the game is to answer a question correctly and score points for your team. The opening screen gives a math problem, and the player enters the answer. If correct, the player's team gets the points; if incorrect, the opposing team gets the points, and the correct answer is shown to the left of the problem. The player presses ENTER for the next problem. There is no limit to the length of play.

I tried to create an interesting way to present the math drills I used with this program. Math drills are especially conducive to computer programs because the computer can generate a seemingly endless number of questions with only a few lines of program code.

Line 180 sets up the numbers for each example. The random number limits of variables `AA` and `BB` determine the limits of the example's numbers. This particular program involves multiplication. I set it up for a two-place number up to a value of fifteen times a one-place number. I thought that limiting the larger number to fifteen gave many middle- and upper-grade students the opportunity to do the problems mentally.

You can easily alter the limits on Line 180 to change the level of program difficulty. For example, if you change the line to read:

```
180 AA=10+RND(89):BB==10+RND+(89
):CC=AA*CC
```

you get a program that tests only two-place numbers by two-place multipliers.

Math drills are especially conducive to computer programs because the computer can generate a seemingly endless number of questions with only a few lines of program code.

You can just as easily create an addition program for three single-digit numbers by adding a new variable (`EE`) and changing the line to read:

```
180 AA=RND(9):BB=RND(10):EE=RND(
10):CC=AA+BB+EE
```

Of course in this case you need to change Line 190 to reflect the change from times to plus and the addition of a third variable. Similarly, you can change the program to drill almost any kind of math problem.

Topics other than mathematics can also be used by this program. If you insert `DATA` statements that include questions and their answers, almost any subject area can be quizzed in this basketball game format.

This program draws two low-resolution basketball players, as well as posts and goals. Lines 30 through 170 perform the drawings. Most of the points are poked into memory locations on the screen, which is the most compact way of setting individual points. The two large areas of the backboard, however, use `SET` and are located on lines 70 and 80. `SET` gives us an easy method for coloring larger areas of the screen. It might be interesting for you to experiment with these two methods of drawing points to compare their relative usefulness.

If the child gives a correct answer, the player's team scores and two points are added to the total. If the question is missed, the opponent (the computer) scores the two points; the ball, which is originally drawn on Line 190, is moved to score a basket. `POKE 1199,148` draws the dot represented by `CHR$(148)` at screen memory Position 1199. Line 210 checks the child's answer and directs the computer to either of the routines, which start at Line 220 or 250, respectively.

The routine at Line 220 shoots the ball into the opponent's basket and adds two points to the opposition while the routine at 250 scores two points for the player's team. With several minor additions in these areas, this program can be turned into a two-player or two-team game. I leave it for some brave reader to attempt this.

Also, some readers might prefer to insert a time limit on answering each question. The answer is looked for by the program at Line 200. I did not include a timer because I preferred to use the program for mental arithmetic and felt a timer would be inappropriate.

Next month I will expand the basketball program to include a timer, the high score needed to end the game, and `DATA` statements to demonstrate that this format can be used successfully with subjects other than math, such as foreign language and social studies.

Feel free to alter and use this program in any way to help your children and students. ❑

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees, and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

16K Extended

80 0
150 173
220 230
END 99

The Listing: BASKET

```
10 REM"THE BASKETBALL MATH DRILL
- STEVE BLYN,COMPUTER ISLAND,STA
TEN ISLAND,NY,1989"
20 CLS0:X=RND(-TIMER):FOR X=1408
 TO 1471:POKE X,246:NEXT X
30 FOR X=1377 TO 1383:POKE X,172
:NEXT X
40 FOR X=1400 TO 1406:POKE X,172
:NEXT X
50 FOR Y=1156 TO 1348 STEP 32:PO
KE Y,239:NEXT Y
60 FOR Y= 1179 TO 1371 STEP 32:P
OKE Y,239:NEXT Y
70 FOR X=2 TO 16:FOR Y=0 TO 7:SE
T(X,Y,8):NEXT Y,X:POKE 1060,191
80 FOR X=47 TO 61:FOR Y=0 TO 7:S
ET (X,Y,8):NEXT Y,X:POKE 1083,19
1
90 PRINT@99,"000";:PRINT@122,"00
0";
100 POKE 1196,223:POKE 1203,197
110 FOR Y=1228 TO 1296 STEP 32:P
OKE Y,218:NEXT Y
120 POKE 1323,214:POKE 1354,214:
POKE 1324,221:POKE 1357,217
130 POKE 1260,222:POKE 1229,214:
POKE 1259,214:POKE1290,212
140 FOR Y=1204 TO 1300 STEP 32:P
OKE Y,202:NEXT Y
150 POKE 1331,198:POKE1362,198:P
OKE 1332,205:POKE 1365,201
160 POKE 1268,206:POKE 1237,198:
POKE 1206,194
170 POKE 1267,204:POKE 1234,201:
POKE 1201,193
180 AA=10+RND(5):BB=RND(9):CC=AA
*BB:REM SET-UP OF THE EXAMPLES
190 PRINT@448,"":PRINT@452,AA;"T
IMES";BB;"= ";:POKE1199,148:REM-
THE BALL
200 LINEINPUT DD$:DD=VAL(DD$):RE
M-STUDENT'S ANSWER
210 IF DD=CC THEN 250 ELSE 220
220 FOR Y=1199 TO 1080 STEP-30:
POKE Y,148:SOUND 230,2:POKE Y,12
8:NEXT Y
230 FOR T=1 TO 3:POKE 1083,239:P
LAY"L10A":POKE 1083,191:PLAY"G":
NEXT T:B=B+2:PRINT@122,B;
240 PRINT@474,CC;:GOTO 270
250 FOR Y=1199 TO 1080 STEP-34:P
OKE Y,148:SOUND 230,2:POKE Y,128
:NEXT Y
260 FOR T=1 TO 3:POKE 1060,239:P
LAY"L10F":POKE 1060,191:PLAY"F":
NEXT T:A=A+2:PRINT@99,A;
270 EN$=INKEY$
280 IF EN$=CHR$(13) THEN 180 ELS
E IF EN$="E" THEN 290 ELSE 270
290 CLS:END
```

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A new development in the darkroom

Exposing the CoCo to Photography

Exposing the CoCo to Photography

by David Bodnar

My interest in photography and darkroom work was recently rekindled when my daughter, Jill, was chosen to be a photographer for her high school yearbook. After pulling my equipment out of storage and setting it up, we discovered that everything worked except the timer that automatically turned the enlarger on and off. It had not survived eight years in the attic!

Rather than buying a replacement, I decided to put an extra Color Computer to use and see how it would do as a darkroom timer. The program, *Darkroom*, and the project presented here are the results.

Dave Bodnar has been involved with educational uses of computers for the last six years. He has written many educational programs for Tom Mix Software, including Teacher's Database. *He can be contacted at 26 Ralston Place, Pittsburgh, PA 15216.*

The first problem we faced was connecting the computer to the enlarger. There is a relay in the computer that is used to turn the cassette motor on and off, but it is not safe to run 120 volts for the enlarger directly through this relay. The solution is to use this relay to drive another larger relay that can safely control the enlarger.

I used a solid-state relay because I had several in my junk box. A solid-state relay is ideal for computer control because it has only four pins on it. Two of the pins receive a DC voltage from the computer, and the other two pins are connected to a break in the AC circuit that is to be controlled. The DC turn-on voltage can be between three and 30 volts, and the controlled AC voltage can be up to 280 volts. A source for these relays and other parts is listed in Figure 1.

To have the computer control the relay, I simply connected the two DC pins of the relay to a voltage source on the computer that can be turned on or off by software.

The first thing I tried was to use the RS-232 port. When you poke a zero into Location &HFF20, one pin on the RS-232 will have +5 volts appear on it. Poking a 2 into &HFF20 turns the voltage off. If all you want to do is turn the relay on and off, this is fine; unfortunately the memory location that controls the RS-232 also has responsibility for other things. I find that any time I use a `SOUND` or `PLAY` command in the program, the enlarger turns off. Since I want to use sounds as signals, an alternate method of keying the relay is needed.

The simplest and most reliable way to control the relay is by using the cassette relay. Unfortunately `MOTOR ON` and `MOTOR OFF` do not control a voltage but only close two contacts. I need to add a voltage to stimulate the relay, so I tap +5 volts from Pin 5 of the joystick port. A 3- to 9-volt battery can be used instead, but then you run the risk of having the battery fail in the middle of a session in the darkroom. The schematic for the computer/enlarger interface is in Figure 2.

Figure 1: Parts List

Solid-state relay	ITTP1	Hosfelt
Fuse holder	FH66	Hosfelt
	270-364	Radio Shack
Grounded outlet	EO4	Hosfelt
Power cord	BLD-6	Hosfelt
Cassette plug	DP5-180	Hosfelt
	274-003	Radio Shack
Joystick plug	DP5-270	Hosfelt
	274-020	Radio Shack

Misc.: Fuse appropriate for enlarger bulb, enclosure, wire grommets, wire, solder and tools.

You can contact Hosfelt at:
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(800) 524-6464

The easiest way to connect to the computer is to purchase an extra connector for the cassette port from Radio Shack. It should be wired according to Figure 2. The +5 volts can be accessed by disassembling the joystick connector you are using to control the program and soldering a wire to Pin 5. Alternately you can carefully push a small paper clip or finishing nail into the hole for Pin 5 in the unused joystick jack on the back of the computer. Be forewarned that this is a temporary connection at best, and it can easily be pushed out of place. The cleanest solution is to buy another joystick connector and solder a wire to Pin 5. A source for these connectors is also listed at the end of this article.

Once you get the four wires (two from the relay for +5 volts and ground) from the back of the computer, you are ready to

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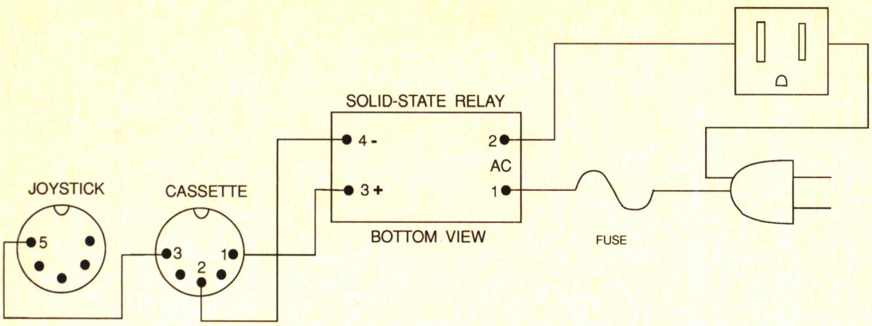

Figure 2

build the rest of the interface. The solid-state relay easily fits into a small construction box. Because you are working with potentially hazardous house current, you must be sure to use a fuse in the hot (black) line from the wall plug. You should also use a three-wire plug and socket so you can ground whatever case you wind up using. Most of the parts are available at Radio Shack, and suggested part numbers are given.

The second decision was one involving the human interface — in other words, how the user controls the program. On our first attempt, Jill entered exposure times using the number keys, which presented several problems. First, the keys are hard to see in a darkroom unless you have a safelight directly over the keyboard. Second, I was not anxious to have fingers that might be coated with fixer, stop bath or developer on the keyboard. The solution is to use a single joystick to control all functions of the program. With a little practice Jill was able to enter exposure times very quickly.

Before using the program in the darkroom, give some thought to where the computer, TV and joystick will be placed. The TV must be close enough to the enlarger for you to see the screen but far enough away to prevent the picture from fogging the paper. I find that if you turn the contrast and brightness controls on a black-and-white TV almost to the point where the picture disappears in normal room light, it is perfectly readable in the darkroom under safelights. It is also best to place the screen pointing away from the enlarger. A darkroom normally has a dry and a wet area. It goes without saying that the computer and TV belong in the dry area.

To use the program, first connect the cassette and joystick to the computer and the enlarger to the solid-state relay. Place the joystick in the center position. (Auto-centering joysticks seem to work best with this program although it has been tested with regular joysticks and a mouse.) In the center of the screen you will see an asterisk (*), which can be moved by moving the joystick from side to side.

In its current form the program performs three different functions. First it allows you to turn the enlarger on or off for framing a negative. This is done by using the joystick to place the asterisk in the center position and pushing the stick up for on or down for off.

The second function is to set the exposure time for the enlarger. This is done by moving the joystick to the right so the asterisk is above `ENLARGER TIME`. Once the asterisk is to the right, press the joystick button and, while keeping the stick to the right, push it up to increase the exposure time or down to decrease the time. Once the time is set to your satisfaction, release the button and return to the center position. Pressing the button from the center position starts the timing sequence. Pressing the button while the enlarger is counting down aborts the exposure.

The third function of *Darkroom* is designed to give the darkroom worker an idea of how much time the photographic paper has been in a particular solution. This is called setting the beep time. If the beep time is set to 10 seconds, for example, a single tone sounds after 10 seconds; two tones sound after 20 seconds; three after 30, and so on. After six tones sound, it resets to 1 and starts over again. This is done because it is very hard to keep track of the number of tones beyond six. Six 10-second periods are one minute, a common development time for most papers. All you have to do is listen for the correct number of beeps and switch the paper from developer to stop bath to fixer. Note that the beep counter is reset to 1 anytime the enlarger is switched on or off. The beep time can be changed in the same manner as the enlarger exposure time is set. If the beep time is set to 0, the tones are disabled.

Many modifications to the program can be made. For example, the beeps are controlled by lines 900 through 940. You could have the number of beeps reset after three rather than six beeps by changing Line 900. With a bit of work you could even have the computer announce the time with the speech pack. That modification is on my list, but I haven't decided if it is worth the trouble.

Other timers could be added to advise you to remove paper from a wash bath. Just about any timing chore you need to do can be handled by the computer.

To me the most interesting modification is to use the other joystick input as an A/D converter. This allows you to use a Cds photosensor or phototransisitor to measure the light coming through a negative and falling onto the photographic paper. Ultimately such a system could help you to compute exposure times. ❑

Solution for *Mazeway* program on Page 50.

```
DRRDDRRRRDDLLL
LLLDDDDDDDDRRR
RRRUURRDDLLLLL
LLLUUUUUUUURRD
DRRRRRRDDLLUUR
RRRUUUUUULLDDD
DDDLLDDLLLLUUU
ULLDDDDDDDDRRR
RUURRDDLLLLLLU
UUUUUUURRUUUUR
RUURRRRRRDDRRR
RRRDD
```

U=UP ARROW
D=DOWN ARROW
R=RIGHT ARROW
L=LEFT ARROW

16K Extended

110	165
160	186
600	6
737	119
900	86
END	165

The Listing: `DARKROOM`

```
0 'COPYRIGHT 1989, FALSOFT INC.
10 MOTOROFF:BEEP=10:ENLARGER=30:
EO=2'EO=2 IF ENLARGER OFF;EO=0 I
F ENLARGER ON
20 I$="*":BL$=CHR$(128):P1=32*5+
4:P2=P1+12:P3=P1+24:J0=30:TIMER=
0:BCOUNT=0:PAUSE=80
99 REM MAIN LOOP
100 CLS0:PRINT@32*1+3,"COMPUTER"
+BL$+"OPERATED"+BL$+"DARKROOM";:
PRINT@32*3+8,"(C)"BL$"D."BL$"BOD
NAR"BL$"1986";
107 IF J0<20 THEN PRINT@P1,I$;:P
RINT@P2,BL$;:PRINT@P3,BL$; ELSE
```

```
IF J0>40 THEN PRINT@P3,I$;:PRINT
@P1,BL$;:PRINT@P2,BL$; ELSE PRIN
T@P2,I$;:PRINT@P1,BL$;:PRINT@P3,
BL$;
110 PRINT@32*7+2,"beep";:PRINT@3
2*8+2,"time";:PRINT@32*7+12,"enl
arger";:PRINT@32*10+15,"on";:PRI
NT@32*12+15,"off";:PRINT@32*7+24
,"enlarger";:PRINT@32*8+26,"time
";
115 PRINT@32*10+2,BEEP;:PRINT@32
*10+26,ENLARGER;
120 GOSUB 1000 ' READ JOYSTICKS
0 AND 1 AND BUTTON
125 IF BOFF<>-1  THENPRINT@32*12
+2,BEEP-INT(TIMER/60);:IF TIMER>
=BEEP*60 THEN GOSUB 900'SOUND BE
EP IF ENABLED
130 IF (J0<40 AND J0>20) AND J1<
20 THEN EO=0:GOSUB 500 ' ENLARGE
R OFF
140 IF (J0<40 AND J0>20) AND J1>
40 THEN EO=2:GOSUB 500 ' ENLARGE
R ON
150 IF (J0<40 AND J0>20) AND BU=
0 THEN GOSUB 600' ENLARGER ON
160 IF J0<20 THEN GOSUB 700:GOTO
107'SET BEEP
170 IF J0>40 THEN GOSUB 800:GOTO
107'SET ENLARGER TIME
180 PRINT@32*15+3,BL$;BL$;"butto
n"BL$"to"BL$"start"BL$"enlarger"
;BL$;
400 GOTO 107
499 REM ENLARGER ON/OFF TO FRAME
500 IF EO=0 THEN GOSUB 2000 ELSE
 GOSUB 3000
505 IF EO=0 THEN PRINT@32*10+13,
I$;:PRINT@32*12+13,BL$; ELSE PRI
NT @32*10+13,BL$;:PRINT@32*12+13
,I$;
510 RETURN
599 REM ENLARGER ON FOR TIME
600 EO=0:PRINT@32*15+3,BL$;BL$;B
L$;"button";BL$;"to";BL$;"stop";
BL$;"enlarger";BL$;:TIMER=0:GOSU
B2000:GOSUB500
605 FF=0'FF IS TO AVOID DOUBLE H
IT ON BUTTON - DELAY
610 FF=FF+1:GOSUB1000:IF (BU=0AN
D FF>10) THEN GOTO 620 ELSE PRIN
T@32*12+26,ENLARGER-INT(TIMER/60
);:IF TIMER<ENLARGER*60 THEN 610
620 EO=2:GOSUB500:PRINT@32*12+25
,STRING$(5,128);:BCOUNT=0:RETURN
699 REM SET BEEP
700 PRINT@32*15+3,"button"BL$"to
"BL$"set"BL$"beep"BL$"time";BL$;
BL$;BL$;:GOSUB 1000
710 IF BU=1 THEN BCOUNT=0:RETURN
720 IF J1>40 THEN BEEP=BEEP-1 EL
SE IF J1<20 THEN BEEP=BEEP+1
730 IF BEEP<1 THEN BEEP=0:BOFF=-
1 ELSE BOFF=0
735 PRINT@32*10+2,BEEP;
737 FOR DE=1 TO PAUSE:NEXT ' DEL
AY TO MAKE SETTING MORE EASY TO
CONTROL
740 GOTO 700
799 REM ENLARGER TIME SET
800 PRINT@32*15+3,"button"BL$"to
"BL$"set"BL$"enlarger"BL$"time";
:GOSUB 1000
810 IF BU=1 THEN BCOUNT=0:RETURN
820 IF J1>40 THEN ENLARGER=ENLAR
GER-1 ELSE IF J1<20 THEN ENLARGE
R=ENLARGER+1
830 IF ENLARGER<1 THEN ENLARGER=
1
835 PRINT@32*10+26,ENLARGER;
837 FOR DE=1 TO PAUSE:NEXT ' DEL
AY TO MAKE SETTING MORE EASY TO
CONTROL
840 GOTO 800
899 REM BEEP
900 IF BOFF THEN RETURN ELSETIME
R=0:BCOUNT=BCOUNT+1:IF BCOUNT>6
THEN BCOUNT=1
910 FOR X=1 TO BCOUNT
920 PLAY"T20AP30"
930 NEXT X
940 RETURN
1000 J0=JOYSTK(0):J1=JOYSTK(1):B
U=PEEK(&HFF00)AND1
1010 RETURN
1999 REM MOTORON
2000 POKE&HFF21,PEEK(&HFF21)OR 8
:RETURN
2999 REM MOTOROFF
3000 POKE&HFF21,PEEK(&HFF21)AND&
HF7:RETURN
59999 REM D. BODNAR 11-11-86
60000 VERIFYON:SAVE"DARKROOM":SA
VE"DARKROOM:1"
```

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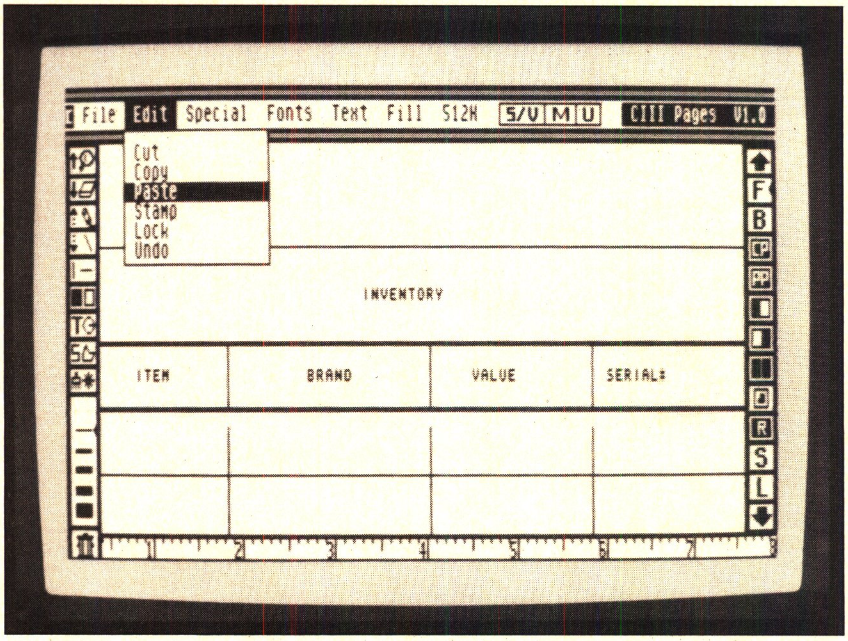

Software CoCo 3

CIII Pages— The Latest in CoCo Desktop Publishing

Despite considerable attention by the computer world for the last few years, desktop publishing remains a term frequently in need of definition. Perhaps the easiest description would be to say that desktop publishing combines elements of word processing, graphics editing and typesetting into an interactive environment for a single user.

CIII Pages, from Microcom Software, is a desktop publishing program for the Color Computer 3. It provides an extensive array of features, a simple menu-driven interface and a generous helping of supporting files and programs. All of this works together as an electronic paste-up board, on which you can compose fliers, imaginative signs, newsletter pages, or virtually anything you might want to convey via printed page.

CIII Pages comes on three disks that are not copy-protected. Making a working copy of the disks from the masters is the first order of business, and detailed instructions for this are provided in the accompanying 68-page manual. The System disk contains the main program and its supporting files and subroutines. The Utility disk offers sample text and graphics files, an extensive collection of clip art, and a utility program for converting and manipulating `PMODE4` and `HSCREEN3` pictures. Finally, the Font disk gives you access to 14 banner fonts, in addition to the eight type fonts and two graphics fonts available on the system disk.

To use this package your system must include the following items:

- CoCo 3 with 128K or 512K
- RGB or composite monitor (it will not work with a TV)
- at least one disk drive
- either Disk `BASIC` or *OWLDOS*
- Tandy Hi-Res Joystick interface
- joystick or mouse
- an Epson or Gemini printer, or a Panasonic 1090/1091i
- DMP-105 or NX1000

Other configurations, such as other printers or different operating systems, are not necessarily supported and may not work.

When the main program boots, the title screen dissolves into the basic working screen, which is a blank workspace surrounded by a "frame." The frame gives access to the program's myriad tools and functions through a combination of point-

and-click commands and pull-down menus. The top part of the frame is a menu bar. Using either a mouse or a joystick, you can click on any of the menu titles, revealing the available functions in that category. Menu titles include File, Edit, Special, Fonts, Text, Fill and 512K. Once you have clicked on a menu title, the pull-down menu stays onscreen until you either click on a specific function or move the cursor off the right edge of the screen.

The File menu contains commands to load or save a formatted page, load a picture, examine the disk directory, delete a file from disk, or print. There are also commands for clearing the workspace, quitting the program and saving the workspace in a *Max-10* format for subsequent importing into Colorware's software.

On the Edit menu are the functions Cut, Copy and Paste, for duplicating and moving portions of the workspace. A Stamp function gives the added capability of repeatedly pasting the last cut or copied image into the workspace by simply moving the mouse (or joystick) and clicking. Two other features on the Edit menu are Lock and Undo. The Lock command is only applicable to the most recently pasted image, but enables you to paste something onto the screen and then designate it as a permanent image. The Undo command is similarly limited, enabling only an undo of the last paste.

The Special menu is used to manipulate selected areas of the workspace in a variety of ways. You can flip an image horizontally or vertically, rotate it 45 or 90 degrees, enlarge it four or eight times, or stretch it.

The Fonts menu provides access to all 24 available fonts. (A font is simply a particular style of forming characters.) Ten of these (eight type fonts and two graphics fonts) are accessible on the system disk and are listed individually on the Fonts menu. The other 14 are banner fonts used to print large characters. They are stored on the separate font disk. Access to these fonts is gained by selecting the command Bannerfonts from the Fonts menu.

In order to import ASCII files into *CIII Pages*, the Text menu is used. Files can be read in in a number of ways, including boxed regular, boxed formatted, formatted, and frame/form. The differences between these options have to do with the way the incoming file was formatted by the word processor that created it. Since most of my text files are either unformatted or only marginally formatted, I stick with the boxed regular command.

When used in conjunction with *CIII Pages*' graphics editing capabilities, the Fill menu enables you to fill in existing shapes on the workspace with any of a variety of patterns, or to draw new boxes on the screen and have them automatically filled with the selected pattern. You can also select from an even wider variety of patterns for subsequent use with the Brush tool in order to cover any area of the screen with that pattern.

The final menu is the 512K menu. When using CIII pages with a 128K CoCo, you can work on a one-page document only. If you have more than one page, each must be created individually and saved as a separate file on the disk. With a 512K machine you can work on up to three pages at once. The 512K menu provides tools for moving between the pages, and for copying portions of the workspace from one page to another. It also includes a command for reading a long text file into the three available pages of your workspace.

The menu bar, of course, occupies just one side of the frame surrounding the workspace. Along the left side of the screen is a palette of tools for creating and manipulating both graphics and text. By moving the mouse onto this palette and clicking, any of a number of tools can be selected. Four arrows are available for scrolling up or down either a screen at a time or a line at a time. (It takes two screens worth of lines to display a one-page document, but by scrolling you can display any contiguous half page you want.)

A magnifier tool enables you to zoom in on a selected area of the screen and even redraw individual pixels if you like. Other tools can be selected to draw, create circles, boxes, lines or polygons, or to paint patterns on the screen. There is also (thank goodness!) an eraser for those times when things just don't quite turn out the way you planned! You can choose from various line widths on this palette as well to specify the thickness of the lines you draw with any of the tools. Another unique capability is the Shapes tool with which you can select from diamonds, squares, rectangles, trapezoids or a combination of two of them, and then use the Stamp function to repeatedly place the selected shape(s) on the workspace. Finally, there is a Text tool for entering or editing text.

On the right side of the frame is yet another palette, giving access to more tools. From this palette you can specify whether incoming text files will overwrite any existing images on the workspace or be superimposed on them. You can copy and paste *panels*, half-screen (quarter-page) images. You can also pull up a temporary panel onto which you can paste items from the workspace as you rearrange them to your satisfaction. The temporary panel (or clipboard) can then be pasted back onto the

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page. A Page Preview function can be selected from this palette to give you a WYSIWYG (What You See Is What You Get) preview of the printed page. Also on this palette are commands for saving and loading. These are similar to the Save and Load functions on the menu bar, but they do not go through a subsequent dialog box asking for a drive number and filename. Instead, they do a quick save or load to a predetermined file. This feature encourages frequent saves of a document during the editing process.

The bottom of the frame is a ruler for assistance in lining up images too big to fit on one screen.

There are a lot of positive things to be said for *CIII Pages*. As you can see from the above discussion, there are a lot of tools and capabilities built into this program. I used a mouse, rather than a joystick, and it worked very smoothly. The frame provides ready access to the majority of the program's features in a compact space; and once you select a function, the frame often disappears, giving you more room to work on the page image. The fonts provided with the program are excellent, and the screen image on my monochrome monitor was sharp and clear.

Despite the restriction of having only one page to work with on my 128K CoCo, many of the tools, such as the temporary panel and the Page Preview function, made it easy to manipulate and view the page in large pieces. I was able to set up a page, stare at it a bit, then totally redo it without difficulty. With the accompanying Utility disk you can import graphics from other programs and place them wherever you want on your page and even write out a page to be imported into *Max-10*.

All of these functions combine to provide an extensive desktop publishing capability not previously available for the Color Computer. The most delightful aspect of the package, though, was speaking to Walter Bayer, the man responsible for designing and programming *CIII Pages*. He was extremely friendly and helpful, and was more than willing to answer my questions both before and after I admitted I was writing a review of his product.

There are, however, a number of things I find quite annoying about this program. Although it combines features of both a graphics editor and a word processor, it is not nearly as strong as either in doing those specific functions. The Undo function is so limited as to be nearly useless. The Text Entry function does not support typing ahead, and I was constantly having to back up and force myself to slow down. Many of the graphics routines are written in BASIC and are unbearably slow. I tried out the Flip Horizontal function four times before I realized it really was working. On the first three tries I thought it had died and I cancelled it. Finally, on the fourth try, I waited longer, and was just about to cancel it again when I noticed a few pixels moving on the screen. The manual warned that these functions are slow, but I was still appalled at having to wait over 10 minutes for the software to do a single horizontal flip.

Another major drawback for me was the lack of support for my DMP-130 printer. Although the program did print fine with the Epson printer I borrowed from work, it is nonetheless disconcerting to have my old philosophy shot down. I used to always buy Tandy equipment whenever possible so I wouldn't have to worry so much about compatibility. Also in the area of printing, in order to configure the program for a different printer or a different baud rate you have to load, edit and resave the BASIC driver program. While I am entirely familiar with BASIC, I still find it irritating to have to diddle with code when a configuration function is so easy to provide.

Most of the problems mentioned above are documented in the manual. However, the biggest problem of them all is the manual itself. Length is not an indication of quality. Throughout its 68 pages, the *CIII Pages* manual is riddled with incorrect grammar, along with reference sections not found in the table of contents or the index.

Some software packages are so simple and easy to use that you can extract all possible functionality without ever opening the manual. Others are so complex and user-hostile that you can't do a solitary thing without reading for an hour. An ideal software package strikes a balance. I like to first fiddle with the program a bit and get a feel for it. Then I browse the manual for a while and find the "hidden gems" that I wouldn't find onscreen. *CIII Pages* utilizes what seems to be an increasingly standard interface. Pull-down menus are more and more common and usually function in the same way. However, this package has the appearance but not the substance of being standardized. I tried in vain for nearly an hour to load an ASCII file from the File menu. (That's what File menus are for, right?) It never occurred to me that loading a text file was done in the Text menu.

Similarly, in every WIMP (Windows, Icons, Menus and Pull-downs) interface I've used, you select something first, and then specify an action to take. For instance, you highlight an image, then say "copy." In *CIII Pages*, though, you first specify the action, then select the affected area of the workspace. I was convinced that half the features in the program didn't work, until I re-read the section on different types of cursors, where this is pointed out. It is also in this section that instructions are given for exiting various functions like the Pencil drawing tool. I initially tried drawing with the pencil and had to force an error condition (which I shouldn't be able to do) to get the frame back on the screen. I kept rereading the section in the manual about the pencil tool, but it simply does not say how to get out. It took a phone call to Mr. Bayer to straighten me out on that one, and on the text file problem above.

There is also an enormous number of keyboard commands that modify the way basic functions work. For example, during text entry, pressing the ESC key toggles between overstriking the background and superimposing on it. Pressing the ESC key followed by the F2 key lets you type in reverse video. While there is definite value in having all this capability, the meaning of the keys varies depending on which function you use them with, and the explanations in the manual are often extremely hard to decipher.

My overall reaction to this program is mixed. It does a great deal, if you can hack through the manual and discover the quirks. Some parts are painfully slow, but I'm told a new version is forthcoming that will be much faster. If you don't have more than one page to construct (three with a 512K machine), you can do a reasonably good job of pasting together something to suit your needs, combining graphics and text. For the price, it clearly fills a gap in existing CoCo software. But you have to really want to fill that gap.

(Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, 800-654-5244; $49.95, $59.95 with Hi-Res interface, $79.95 with interface and mouse)

—Jim K. Issel

Software CoCo 3

Simply Better 2.0— Significantly Better? *Mais Oui!*

The first version of *Simply Better* was a gem. I was hard-pressed to see any reason for an upgrade — the program already did practically anything you could ever want a CoCo 3 word processor to do. However, a new version, *Simply Better 2.0*, has been released, and I am pleased and delighted to find that it sports even more new features I cannot live without. RAINBOW's Cray

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Augsburg introduced the original version of *Simply Better* in his comprehensive review, which appeared in the April 1989 issue, Page 134. Instead of repeating information you probably know, I will instead focus on the new features of Version 2.0. Please refer back to Mr. Augsburg's review for more information on this product.

Most of the changes made in 2.0 are cosmetic. Some of the command keystroke combinations have been changed to make them easier to remember, more mnemonic *and* ergonomic: Things are where they should be. However, it may take you a while to come to that conclusion if you are familiar with the original version.

At first I was sorely aggravated by the change. After all, my fingers had become accustomed to certain command combinations, and here the author was changing things around! Users who are upgrading from the original version may find the new layout a headache at first, but new users of *Simply Better* should rejoice because this command-driven structure is easy to remember. For example, the old command for mail merging was CTRL-A. The new command is ALT-CTRL-M. To "find" text now, you press CTRL-F instead of CTRL-L. More logical, *oui*?

Which leads to the next improvement in *Simply Better* — something entirely new, which has been sorely needed in the CoCo word processing realm — an easy, logical way to deal with French characters for our French-Canadian neighbors to the north (and also for the CoCoists taking French 101). A 35-page French supplement is available that not only shows how to type the French characters, but also tells how to use the whole program — it's a distillation of the entire *Simply Better* manual, written in French.

The author proposes an analogy that makes it very easy to remember how to deal with accented letters. You think of the accent as a letter v, whose vertex can be up, right or left. For example, a circumflected o (ô) would have its "vertex" at the top — it would be an upside-down V. To type a circumflected o you press F1, the *up* arrow (remember, the vertex is up) and then the o. Simple. To get an e with an *accent aigu* (é) you press F1, the left arrow (the vertex would be to the left) and then e. The cedilla (Ç) defies the v analogy, but it too is easy to add: Press F1, the up arrow and then c. I wanted to be impertinent with this French feature, but the program wouldn't let me add *grave* and *aigu* accents to letters that shouldn't have them (such as k and s). *C'est la vie!* French Canadians constitute a substantial part of the CoCo Community, and it is nice that *Simply Better* is making an effort to support them.

In addition to the old commands that have been revamped, Version 2.0 offers several new commands. The new word count command (CTRL-W) comes in very handy. Another new command that should please those who have experience with MS-DOS keyboards is a true backspace key (which the manual persists in calling a "true Delete key" — there is a difference). There's a "Repeat Last" command, which saves fingers from repetitive keystroke combinations. But about the most exciting of the new commands is the Cray-O-Lator. (Evidently, in his correspondence with Dale Rickert, author of *Simply Better*, Mr. Augsburg wanted a pop-up calculator for *Simply Better*.) The four-function, pop-up Cray-O-Lator calculator is a boon to programmers (it can display numbers in binary and Hex along with decimal) and others who need to perform calculations as they write. A memory function is even included.

Those who spend a lot of time writing at the keyboard will appreciate Version 2.0's automatic indentation feature, which tabs over to start a new paragraph (dependent on the left margin) when the ENTER key is pressed. Also, there is an upper-/lowercase text converter, which Disk BASIC programmers who program in CoCo's 32-column screen may find to be of use. An "underline space" parameter (`US`) is provided; I really can't see how this would be very useful, except when you are designing forms.

Simply Better is an easy-to-use word processor for those who are disabled or have difficulty typing combination keystrokes. The command keystrokes are set up so that CTRL and ALT should be pressed and released; some programs require everything to be pressed at once, which brings to mind the Twister game of the sixties. In fact, if you try to be fancy and do your ALTs and CTRLs simultaneously, you could get a string of repeating, garbled characters. Most *Simply Better* functions can be performed with one-finger keystrokes. By this keystroke command structure, along with the Eyes feature for the hearing impaired (a flashing border supplements the program's beeps and audible cues), the author shows sensitivity, thoughtfulness and responsibility in letting everyone be able to use his product.

Along with revamping the program, the author revamped his manual, which is a classy, spiral-bound 156-page guide. When you buy Version 2.0 of *Simply Better*, you get a complete manual for 2.0 — not the original manual plus a supplement of addenda and new information. The beginning tutorial section gets users going fast! The index is comprehensive, logical and thorough. I cannot praise the manual enough. The only complaint I can make about it is one of personal taste: It is not typeset with proportionally spaced type, but rather with a monospaced font.

Simply Better continues to live up to its name, and the price keeps staying down. *Simply Better* was a good deal before the new version was released. Now it's a steal!

(Simply Better Software, P.O. Box 20726, Portland, OR 97220, 800-248-8420; $34.95, $7 extra for French supplement)

—Carol Hartman

Software CoCo 1, 2 & 3

Wizard's Castle— Tricks, Traps & Treasures

Forces that mysteriously carry you away, collapsing bridges, a cave with bars and a creature that won't let you into the church . . . sounds like something from behind the old Iron Curtain, doesn't it? Gold coins, a power ring, urns to be rubbed, unicorns, gnomes, a castle and a princess — now it sounds like something from the *Arabian Nights*. A king and a crossbow, a wizard and a dragon, experience points to be bought, kill or be killed . . . it's either medieval times or modern wrestling!

Well, *Wizard's Castle* is all of these and more, rolled into one! It's a fast, machine-language game, completely randomized and with plenty of action. It combines the thinking necessary for an Adventure game with the speed (during the attack sequences) needed to play an arcade game.

While you are trying to find, free and take home a princess, you encounter several creatures, including a powerful wizard, who try to kill you. As you travel the countryside, you find an abundance of items — in the village, around the waterfall and river, and in the fields. Take these objects to the king, and he will be your friend forever. But, of course, what he really wants is to have his princess home again.

The number of objects you can carry at one time depends on how strong you are, and your strength diminishes every time you fight a creature; lingering and loitering at any place tends to draw them there. Don't try to fight creatures without a weapon (and don't try to use the crossbow unless you've found the arrow too). As far as the objects go, if you plan on finding them in the same place, save your game. The random feature places them differently each time you play.

The graphics in *Wizard's Castle* are very well done, in perspective, and animated. The different graphics screens load very quickly as you move from scene to scene, so you aren't waiting for what seems like forever to continue play. It has three skill levels: At the novice level, the author claims the game takes one to four hours to complete. The middle level is supposed to take four to 10 hours, and the expert level over eight hours. I don't believe him. Speaking from personal experience, it will probably take an hour for you just to make an accurate map. While you are trying to draw your map, creatures can appear and start killing you before you're ready. And every once in a while "a strong force carries you away" and drops you someplace else in the game. Then you have to figure out where you are in relation to where you were before you were carried away. I strongly recommend frequent use of the pause feature (called `FREEZE`) while you are drawing your map for this game.

Wizard's Castle is a high-resolution, animated, graphics Adventure game originally marketed by Spectral Associates. It has been resurrected and is being distributed by Microcom Software. There's such a similarity between this game and the Spectral text Adventure game, *Keys of the Wizard*, that I suspect *Wizard's Castle* was meant as a sequel, with graphics added to improve it. Most of the verbs are the same, as are most of the creatures. The unique `READY` and `UNREADY` commands, the dead creatures resurrecting, and your strength and skill all seem to be holdovers from *Keys of the Wizard*.

> **The graphics in *Wizard's Castle* are very well done, in perspective, and animated.**

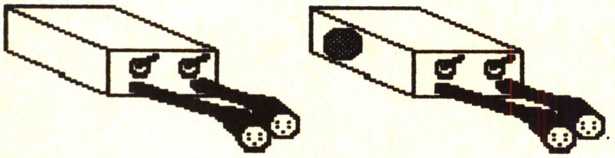
A complete list of verbs understood by the game, a thorough explanation of the two different types of points you can score and buy, and complete instructions on attacking/killing the creatures are all included in the original Spectral docs, which are well-written.

The only requirements for this game are any Color Computer with 64K, Disk Extended BASIC and a single disk drive. Speech capability is provided if you have the optional Speech/Sound cartridge installed. Working backups are easily made — but with the `BACKUP` command, not the `COPY` command because the only file that shows up in the directory is the BASIC loader.

I had fun with this game, but I wish the original author had put in a "repeat last command" single-keystroke capability. It would be useful in the attack sequences to just be able to press a single key instead of typing entire commands over and over when it is necessary to strike a creature more than once. With a price tag of $19.95, *Wizard's Castle* is comparable to games selling for twice the price, but is reasonable considering this game has been on the market for a while. About the only people I can't recommend it to are pre-teens and those with a low tolerance for frustration.

(Microcom Software, 2900 Monroe Ave, Rochester, NY 14618, 800-654-5244; $19.95 plus $3 S/H)

—Gail Allore



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Software

CoCo 3

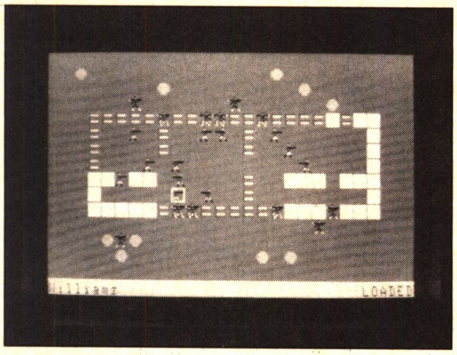
Rorke's Drift— You Against the Zulus

In the fluid heat of Africa a faint rhythmic war chant rises from the hills and flows toward Rorke's Drift where, among a small band of wounded British soldiers, even the weakest hears it and lifts himself to prepare for the oncoming Zulu warriors.

A brave and dutiful remnant of limping soldiers forget their throbbing flesh wounds and begin carrying mealy bags to the north side of the depot where the wall was demolished during the previous day's defeat. They only partially comprehend the intent of the dark Zulu warriors beginning to crawl like a great army of ants from behind the darkening hills ready to devour the soldiers with their stinging spears.

Now that you know the situation, it's time to take action because without you, the tattered men in red will fail to last until the rest of their troop returns from searching the nearby hills.

The Zulu fighters attack in endless succession with their jabbing spears, and you must make efficient use of your troop's only advantage — rifles, which need to be reloaded. Using the arrow keys and specific letter keys, each of your men is allowed three moves during which he can reload his gun, take position and shoot or jab with his bayonet, but without the guarantee of killing a warrior on the first assault. Each member of the opposing force receives four moves if *not* wounded — or two if wounded — and every time a warrior stabs a soldier it reduces the soldier's ability to move. A soldier is killed on the third stab.



Rorke's Drift by SPORTSware can be played on any Color Computer 3 with at least 128K of memory and one disk drive. An RGB monitor is recommended. The graphics clearly show the supply depot constructed of mealy bag and concrete walls housing red British soldiers, while black Zulu fighters pervade from the surrounding area. You can contemplate your men's moves till the cows come home, but after all of them are moved, the opposition closes in on you like a pack of wolves, which is frustrating because you can't mull over your opponent's strategy like you can the moves in a chess game. However, after being defeated numerous times, you figure out where the safest areas are in the depot and get a general idea of how to distribute the British soldiers in those areas.

The instructions give hints concerning how to successfully hold off the Zulus, which I have yet to validate. After more than two dozen games I have been victorious only twice, and that was because I had my last surviving soldier run out of the depot toward a few scattered trees to hide. I think they call it desertion. I didn't care that, according to history, the actual battle was won on the loyal bravery of the individual British soldiers. But after my wimpy victory, I decided to play again and do it the heroic way. I lost again and again, but that's what makes you keep going back to battle.

The documentation is well-written, which makes *Rorke's Drift* easy to use. It even includes an interesting recapitulation of the true historical event upon which the program is based.

(SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, 419-389-1515; $16)

—Kelly Goff

Software

CoCo 1, 2 & 3

Comics+— A Tool for CoCo Cartoonists

If you read Logan Ward's article in the July 1987 RAINBOW (Page 50), you know it is possible to draw and print cartoon strips with graphics programs such as *CoCo Max III*. Up to now there has not been a dedicated CoCo program for drawing comic strips until *Comics+* appeared, an icon- and menu-driven comics-generation program from E.Z. Friendly Software.

Requirements to run *Comics+* are minimal: just 64K, a disk drive, a self-centering joystick (or a mouse) and a DMP 105 or 106 printer. (I really recommend a self-centering joystick — placing art elements is very difficult with the old black-and-red sticks.) The files required to run this "hybrid" BASIC/machine language program are small: 48 granules of free space are left on the disk. Because the program leaves so much free space, you can save your completed files to the same disk (a backup of the program disk, please, *not* the original), eliminating disk swaps. Users are encouraged to make backups of the nonprotected software, but the company warns that traceable ID codes are embedded throughout the software.

The quality of the printouts generated are by no means comparable to what you see in the Sunday morning funnies. And it may be possible that you can do better drawings a little faster and easier with more feature-packed graphics packages, but at $21.45, *Comics+* is a bargain.

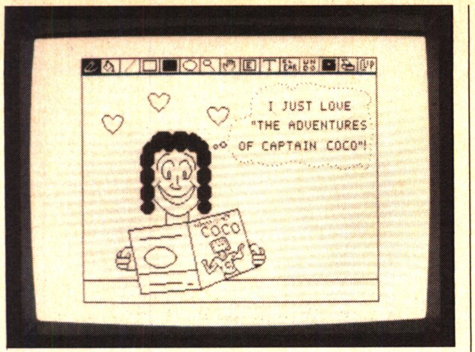
The possibilities for this program are endless. You could draw a family funny and stick it on the refrigerator. You could create funnies to roast your friends, and use the program to create comics for church, school and work.

In case you are not an artist, as most of us are not, *Comics+* comes with a really neat feature — a clip art library. This is a collection of noses, eyes, mouths, "hairpieces," dingbats (hearts, stars, question marks), etc., that you may select to incorporate into your panel. With the larger graphics programs such as *CoCo Max* and *Color Max*, it is possible to build a library of body parts, but of course you have to have a little talent and the time to do it. With *Comics+*, most of the parts are already in the "body shop," and all you have to do is assemble them and type in appropriate text. It is an easy process to assemble a comic. Children and adults who can't keep their hands off Mr. Potatohead should like this clip art feature.

Of course, everything can't be drawn and ready for you; you'll need to do some creative work, too. When you boot the program by entering `RUN"C+"`, you first see a blank screen with a row of 15 icons, or tools, along the top. These icons include: a pencil (for freehand drawing); a paint can (for paint fills — black only); a line; a box; a filled box; a circle; a magnifying glass (for pixel editing); a hand (for moving a selected area to another part of the screen); an eraser; a text tool (for typing words); a clear icon for clearing the screen; an undo icon to undo mistakes; a disk icon to save or load frames; a printer icon; and the clip art icon.

It is easy to select an icon; you just point and click. Certain icons, when selected, yield a menu from which you make further selections.

The cursor takes the form of a blinking dot. To use the pencil, line or box tool after selecting the appropriate icon, you press the firebutton to set a beginning point and



move the joystick until you reach your endpoint. While in the freestyle drawing and erasure modes, you can determine cursor size by pressing the up and down arrow keys: This is a neat feature. The cursor size can incrementally be increased up to five-by-five pixels. Another nice feature is the "rubber stamp" function: A selected area of the screen (or an image plucked from the clip art library) can be "stamped" repeatedly across the screen — just the thing you need when creating a flock of geese or a stand of trees.

You create a comic strip by drawing and saving a collection of panels, each of which is a separate file. At printing time, load in the first panel of the strip — this will automatically print when you select the printing option. You are prompted for the number of panels in your strip. If there is only one, the printing process begins. If you reply that there are more than one, the program prompts you for the filenames of the other panels (a directory-reading option is provided), and it also asks you for your name for the byline. The program expects to print at 2400 baud.

The manual is short but adequate, explaining every icon and how to use the features. Near the end of the manual comes a list of hints. One hint advises users to put backup copies of *Comics+* on picture disks to avoid disk swapping. Another hint suggests that captions should be entered before graphics. This is a good suggestion because text cannot be edited: You must type it right the first time. If you do goof, though, you can use the eraser tool to get rid of it.

Comics+ is not a perfect program but is a good deal for the price. If I could make a wish list, I would ask that the ESC/BREAK key be used to let you back out of options, and not just dump you out of the program. Accustomed to interfaces of other programs, I sometimes press ESC in *Comics+* and am rudely greeted by the CoCo's green Disk BASIC screen. However, typing `CONT` or `RUN` usually gets me back in the program at the scene of the crime. It would be nice if more printers were supported than just the DMPs 105 and 106; there are a lot of Epson owners out there. Also, it would be nice if you could add to the clip art library.

All in all, I think *Comics+* is an excellent program for young and old alike, especially for those with a twitchy funnybone and a bent toward graphics. It is not an all-encompassing program, but for Tandy DMP 105 and 106 owners, it will be a sure source of amusement. It's just plain fun to use.

(E.Z. Friendly, 118 Corlies Ave., Poughkeepsie, NY 12601, 914-485-8150; $21.45 plus $1.50 S/H)

— Margaret Gividen

Software CoCo 3

CoCoRun-12— When One Equals Twelve

I like programs that *do* something. *CoCoRun-12* really fills the bill! It lets up to 12 Color Computer 2 programs run at the same time in a CoCo 3. To use this "multi-tasking" program, you need a CoCo 3 with 512K and a disk drive.

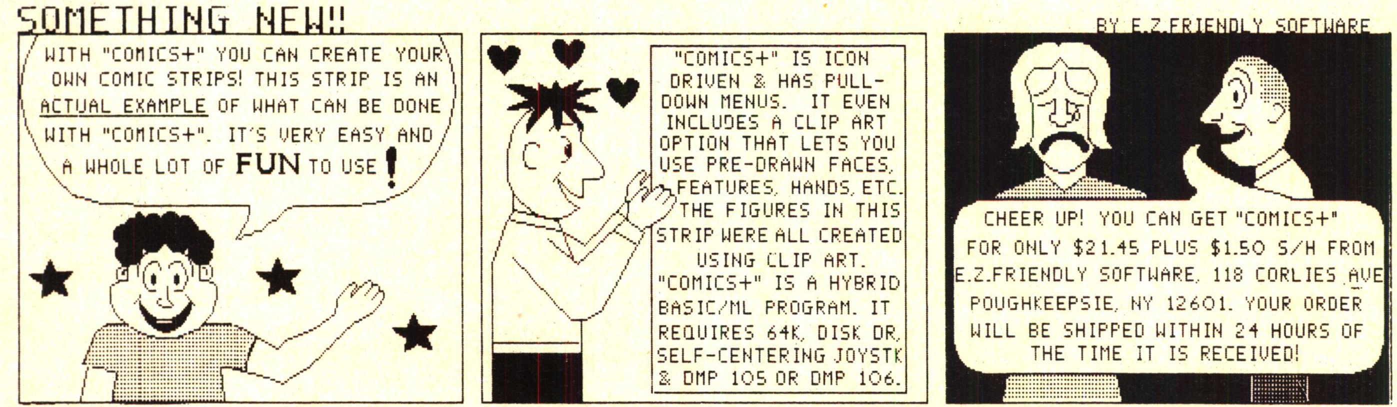
After entering `RUN"COCORUN"`, you are presented with an attractive title screen that describes the program's operation. You are instructed to initialize each bank of memory — there are 12 — which the manual explains how to do, before you can use them. An easy way to do this is to copy the contents of one bank to another. Four function keys are used: F1, F2, ALT and CTRL. ALT and CTRL are for copying information between banks, and F1 and F2 are for memory banking.

If you are running under *ADOS-3*, you must enter `DISABLE`, then press the Reset button, before booting *CoCoRun-12*.

If one bank is in the high-speed mode (`POKE 65497,0`), the other banks are as well. This affects disk drive, cassette and printer operation. It may be best to load each program, then go back and run them. Also, if you have a printer, the baud rate needs to be changed in each bank.

You can't run CoCo 3 programs or enter CoCo 3-specific commands while *CocoRun-12* is in the computer. Only CoCo 2 programs that don't require 64K, or that don't modify the BASIC ROMs, can be run. The memory banking is done in 32K banks, not 64K, so programs performing ROM/RAM switching probably won't be usable in *CoCoRun-12*. There is nothing on the screen to notify the user of which bank he or she is in; you must remember what is in each bank. [*Editor's Note: We recently received Version 2.0 in which the author claims many of these areas have been enhanced.*] Programs do not run concurrently. When the banks are switched, the program in the current bank stops executing and the new bank continues execution where it was interrupted.

The author warns users not to switch memory banks or make saves while the disk drive is running. And you are also cautioned not to attempt a read and a write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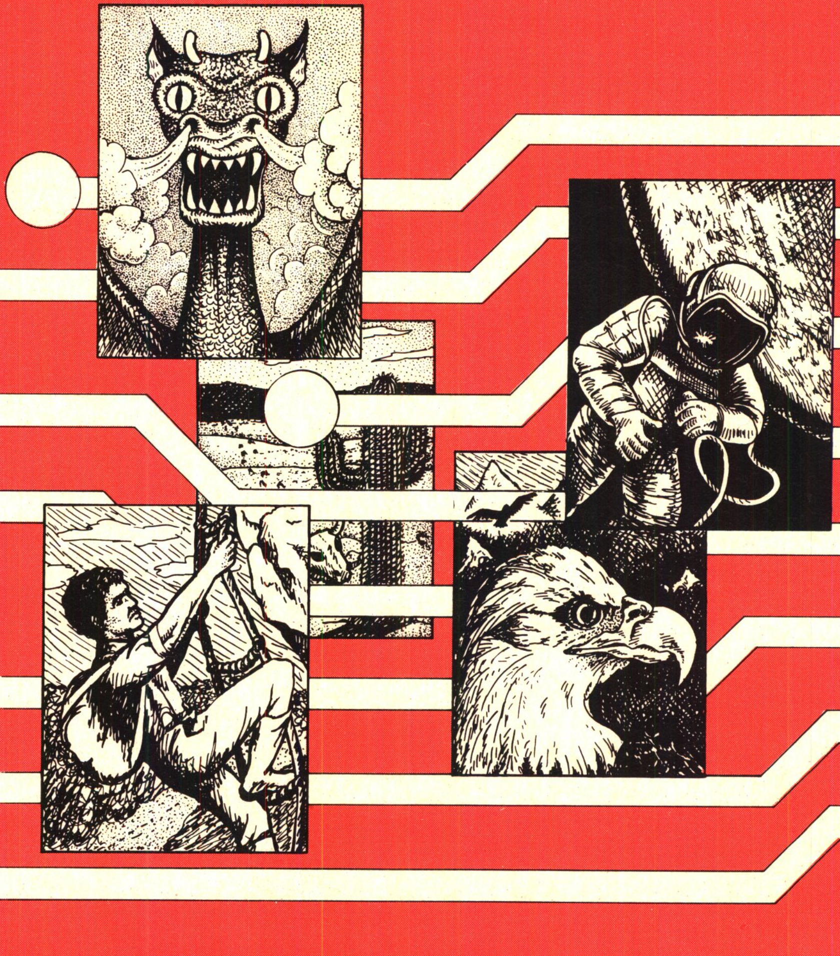

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at the same time, with the same file in separate banks.

One useful application of *CoCoRun-12* is to place copies of the same game (Adventure, etc.) in several banks and try different moves in various banks.

CoCoRun-12 is a fine utility that works as advertised. At $19.95, the program is certainly cheaper than purchasing 12 Color Computer 2s!

(Roger Hallman, 2150 S. 32 St., Milwaukee, WI 53215, 414-383-1532; $19.95)

—Lee Deuell

Software CoCo 3

UltiMusE III — OS-9 Sings

Mike Knudsen has been slaving away at *UltiMusE III* (the *Ulti*mate *Mus*ic *E*ditor) in one incarnation or another for several years. It shows. The latest version, available from Second City Software, is very powerful and well-planned, presenting a sophisticated point-and-shoot interface that makes writing and playing music easy.

Some of the software power comes from the environment: *UltiMusE III* runs under OS-9. The idea of a music/MIDI editor under CoCo OS-9 might stun CoCo users. People who thought CoCo OS-9 wasn't good for graphics or time-critical applications can think again.

Not only is the software high-quality, the documentation is pretty darn good, too. Aside from a few typographic and syntactic slips, the instructions are methodical and well-done. A novice can get up and running within 10 minutes or so.

UltiMusE III runs on a 512K Color Computer 3 with OS-9 Level II. Only one drive is required, and the included instructions clearly outline the way to use *UltiMusE III* on a single-drive system.

I used *UltiMusE III* on a hard-drive system with a Tandy 1000 mouse (two-button), IBM keyboard adapter, and custom MIDI cable (provided for the review by Ed Hathaway of Second City Software — they are made and sold by Howard Medical Computers). I have three main keyboards I used for the review: a Roland S-50 multitimbral sampler, and Korg DW-6000 and DW-8000 digital waveform synths.

Once I installed *UltiMusE III* on my hard drive, I loaded in `VDGINT.IO` from my BASIC09/Config disk. You must do this if you customarily run a windows-only Level II system. *UltiMusE III* uses the VDG screen, so you need to load the proper driver into memory.

After loading `VDGINT.IO`, I used `Xmode` to change the "type" of an uninitialized window to Type 0. This makes the window descriptor a VDG screen. Then I initialized the window and started an immortal shell.

```
OS9: xmode /w7 type=0
OS9: iniz w7
OS9: shell i=w7&
```

I hot-keyed over to the new green VDG screen and started up *UltiMusE III* at the OS9 prompt.

After choosing the Hi-Res mouse adapter at the pop-up window prompt, I saw the main menu. The main menu lets you climb around a directory tree and permits loading old scores and "instrument" files (files that specify MIDI channels and patches).

Starting from scratch is easy. Once you lay out a score (which looks like a real score page), *UltiMusE III* fills each staff with rests. Your goal is to convert these rests into notes. Using a mouse and a "note palette," you choose the kind of note you need (quarter note, half note, etc.) and replace a rest with that note.

UltiMusE III "chips" away at a rest when the note you want to add is shorter in duration than the rest. If the note is longer than a rest, you are "bombing" the rest. You can also chip and bomb existing notes. *UltiMusE III* adjusts the music to fill in the gaps — existing rests and notes adjust themselves to the presence of the new note.

Mousing in accidentals (flats and sharps not present in the key signature) is surprisingly intuitive. Once you correctly place a note on the score, drag your mouse left (or right) and all possible accidentals cycle right next to the note — sharps, double sharps, flats, double flats and natural signs.

I used to be a professional music copyist, and Knudsen's interface works almost as fast as I do, without the ink mess!

Once you mouse in the notes, you can use the Instruments menu to provide voices with instrument numbers. You use only instrument numbers on the score, which are mapped by *UltiMusE III* to appropriate MIDI channels and patch numbers. Numbering schemes include decimal and octal numbering, handy for musicians like me who have Korg synths that number patches from 11 to 88 (eight banks of eight patches each).

You can load in MIDI drivers for Speech Systems' and Intercomp Sound's MIDI packs — or you can use an optional MIDI cable designed for the serial port of the CoCo 3.

If you want to hear some music right away, just set up any MIDI keyboard with your CoCo and load in one of several supplied scores. Some are written by Mike Knudsen himself and are delightful. Others are classics or TV themes. Dozens more are available on information services such as Delphi and CompuServe.

Now that we have covered the basics of mousing in notes, you should know that Mr. Knudsen has bent over backwards to make this program as "human sounding" as possible. You can really make good music with *UltiMusE III*! Having heard *UltiMusE III* at three RAINBOWfests, I find its scores natural-sounding and sophisticated.

You can easily transpose octaves for each part (the transposition can be notated or "implied" by fiddling with the Instruments table), alter the dynamics of each note and the total dynamic range for the entire piece, and establish energy-saving repeats, *dal Segno*'s and multiple endings.

You can compact the display, alter the tempo of playback on the fly, jump around the score using a powerful "Goto" menu, and copy, move, play or delete blocks of music.

Assorted other options are collected under a Random menu. You can choose to play all the score from this menu, or just play the portion of the score you see on-screen. One of the most useful commands here is Redraw, which allows you to clean up the screen after successive bombing, chipping and deleting. You can fork OS-9 commands here, too. (With multiple windows, I don't see why you need this, but if Mr. Knudsen had omitted this feature, *someone* would have noticed!)

There are so many features to *UltiMusE III* that it is difficult to summarize them in a review. The weight of the documentation is testimony to its power.

UltiMusE III is written in C and uses a variety of clever techniques to take advantage of the VDG graphics. I suspect that when an OS-9/68000 computer sweeps across CoCo-land, Mike Knudsen will get one, pull out the OS-9/68000 C compiler, and go to work. In the meantime, *UltiMusE III* is well worth the price. Get it, the special MIDI cable, and a MIDI synth (the more timbres, the better), and expect musical miracles.

(Second City Software, P.O. Box 72956, Roselle, IL 60172, 708-653-5610; $54.95 plus $2.50 S/H)

—Paul K. Ward

Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

KJV on Disk #5, the book of Leviticus from the King James version of the Bible on disk in ASCII files for CoCos 1, 2 and 3. Users need a word processor to view the files. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; $3.*

Label Designer, a program that prints various size labels on a dot-matrix printer, featuring Zebra's graphics user interface of drop-down menus and pop-up windows. Other features include serial numbering, mail merging and disk directory printouts. Includes a set of fonts and a graphics library. Requires a 64K CoCo 2 or a CoCo 3, disk drive, mouse or joystick, and compatible printer. (More than 20 specific printers are supported, including Epsons FX/RX/LX, Star NX1000, Panasonic KXP1080, C. Itoh 8510, and DMPs 105/106/120/130/132/200/400/2100.) *Zebra Systems, Inc., 121 S. Burrowes St., State College, PA 16801, (814) 237-2652; $34.95.*

Riddle of the Ring, a text Adventure that runs in 32 columns. Based on Greek, Roman and Norse mythology, it features 280 different rooms to explore. For a CoCo 2 or 3 with a disk drive. *Eversoft, P.O. Box 3354, Arlington, WA 98223, (206) 653-5263; $10 plus $2 S/H.*

Super Backup Utilities, a set of three backup utilities that have been upgraded to allow multiple-drive backups and to make use of the extra memory in 512K CoCo 3s. There is a utility for 64K CoCos 1 and 2 (backs up 10 tracks at a time, requiring four swaps), a utility for a 128K CoCo 3 (copies 19 tracks at a time, requiring two swaps), and one for the CoCo 3 that has been upgraded to 512K (copies 80 tracks at a time, requiring one pass). Support is provided for 35-, 40- and 80-track disks. *Carl England, 128 Shepherd Drive N.E., Calhoun, GA 30701, (404) 629-7197; $15.*

◆ **Super Boot**, a utility that allows users to boot the Disk Extended Color BASIC system by entering the command `DOS`. It configures the system to the correct baud rate, sets drive step rates and sets the number of tracks and sides for drives. A file (either BASIC or machine language) can be selected to auto-start when the `DOS` command is typed. Requires CoCo 3 and a disk drive. *Carl England, 128 Shepherd Drive N.E., Calhoun, GA 30701, (404) 629-7197; $15.*

Super Disk 1.0, an upgraded CoCo 3 disk utilities package, for the novice to the experienced BASIC and assembly language programmer. It lets users examine copy-protected disks and create copy protection schemes for their own use. Sectors and data can be changed. Includes a 34-page manual that discusses the history of copy protection along with specific Color Computer copy protection techniques. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; $49.*

T&D's Disk #88 October 1989, the October edition of T&D Subscription Software. Ten programs are included: *Sales Prospecting*, a sales prospecting and tracking program for salesmen; *Virus 3*, a CoCo 3 game "played on advanced circuit boards"; *Will Maker*, a program that helps users fill-in-the-blanks to create their own will; *General Journal*, an accounting program; *Police Cadet #5*, a CoCo 3 Adventure game; *Red Dog*, a computerized card game; *Mad Libbs*, a game in which users complete humorous stories by supplying the names of friends; *Macintosh Picture Saver*, a utility that lets Mac graphics files be saved and viewed as `PMODE` pictures; *Frog*, an arcade game; and *P51 Flight Simulator*, an aerial dogfight and flight simulator for one or two players — two players can play each other over modem. T&D disks are released monthly, with 10 programs on each disk ranging from utilities to games to productivity programs. *T&D Subscription Software, 2490 Miles Standish Drive, Holland, MI 49424, (616) 399-9648; $8 per issue.*

Tazman, a graphics and text Adventure that runs under OS-9 Level II. The player becomes a "Tazman," a galactic trader who must reestablish trade routes that collapsed in the War for Freedom. The player must buy a ship and locate planets for trade, but starships and good information come at a price — players must make money by buying and selling commodities. For the CoCo 3. *Eversoft, P.O. Box 3354, Arlington, WA 98223, (206) 653-5263; $24.95 plus $2 S/H.*

A World at War, an updated machine language strategy wargame that pits the "Black" army against the "White"; the computer can control one, both or neither armies. Players can edit icons and determine terrain and battle particulars. For the CoCo 3 and a disk drive. *GSW Software, 8345 Glenwood, Overland Park, KS 66212, (913) 341-3411; $25.*

◆ **First product received from this company**

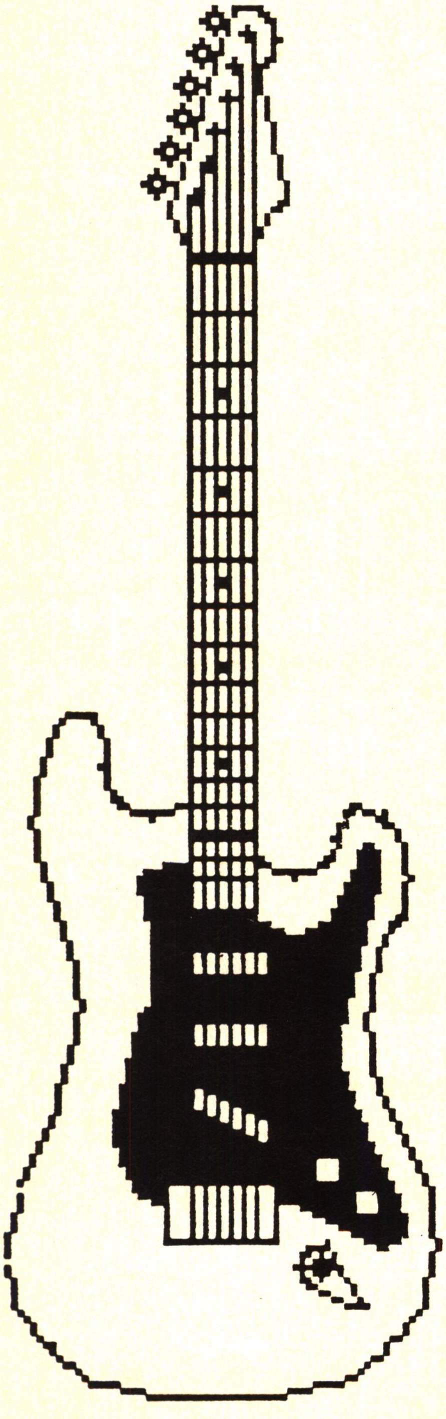
The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items are forwarded to THE RAINBOW reviewers for evaluation.

—Lauren Willoughby

Make your strummin' hum

Guitar 3



by Bill Bernico

This program has become quite handy in my basement hideaway — as handy as my guitar chord book used to be. It displays quite a few guitar chords on the CoCo 3 graphics screen. All you have to do is use the arrow keys to place the box around the desired chord and press ENTER. That chord is then displayed on the sample guitar neck at the left of the screen.

There are 36 possibilities from which to choose. So go ahead, get out your guitar, sit down at the CoCo, and strum away. Just think, if you were an alien with three arms, not only could you strum away at the guitar, you could also pound away at the CoCo, making selections as you strummed. Hmmmmm! ❑

Bill Bernico is the author of more than 300 Color Computer programs. A frequent RAINBOW *contributor, Bill is also a humor columnist for his local newspaper. He started Bill Bernico Software in 1987 and enjoys writing programs and recording his own music. He can be contacted at 16721 Lakeshore Rd., Cleveland, WI 53015. Please enclose an SASE when requesting a reply.*

CoCo 3

50	184
100	84
220	98
330	22
430	84
520	177
630	59
700	155
760	36
850	64
930	248
END	22

The Listing: GUITAR3

```
10 'COPYRIGHT 1989, FALSOFT INC.
20 'GUITAR CHORDS (C) 1989 FROM
    BILL BERNICO SOFTWARE
30 POKE65497,0:HSCREEN2:HCLS4:HC
OLOR8,4:RGB:POKE65434,63:HBUFF 1
,5000:HGET(25,35)-(95,145),1:'ON
BRKGOTO97
40 HPRINT(17,1),"A":HPRINT(17,2)
,"Am":HPRINT(17,3),"A7":HPRINT(1
7,4),"A#  or Bb":HPRINT(17,5),"A
#m or Bbm":HPRINT(17,6),"A#7 or
Bb7":HPRINT(17,7),"B":HPRINT(17,
8),"Bm":HPRINT(17,9),"B7":HPRINT
(17,10),"C
50 HPRINT(17,11),"Cm":HPRINT(17,
12),"C7":HPRINT(17,13),"C#  or D
b":HPRINT(17,14),"C#m or Dbm":HP
RINT(17,15),"C#7 or Db7":HPRINT(
```

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   Type **SENDRAINBOW**, if you do not yet subscribe and wish to do so.
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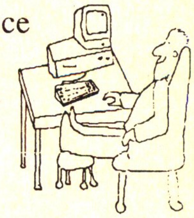

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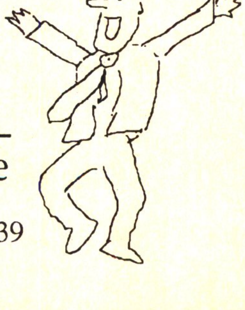

```
17,16),"D":HPRINT(17,17),"Dm":HP
RINT(17,18),"D7":HPRINT(29,1),"D
#  or Eb":HPRINT(29,2),"D#m or E
bm"
60 HPRINT(29,3),"D#7 or Eb7"
70 HPRINT(29,4),"E":HPRINT(29,5)
,"Em":HPRINT(29,6),"E7":HPRINT(2
9,7),"F":HPRINT(29,8),"Fm":HPRIN
T(29,9),"F7":HPRINT(29,10),"F#
or Gb":HPRINT(29,11),"F#m or Gbm
":HPRINT(29,12),"F#7 or Gb7":HPR
INT(29,13),"G":HPRINT(29,14),"Gm
":HPRINT(29,15),"G7
80 HPRINT(29,16),"G#  or Ab":HPR
INT(29,17),"G#m or Abm":HPRINT(2
9,18),"G#7 or Ab7":HPRINT(0,0),"
SELECT CHORD":HPRINT(0,1),"WITH
ARROW":HPRINT(0,2),"KEYS AND":HP
RINT(0,3),"HIT ENTER
90 E$=CHR$(13):H=135:V=15
100 BX$="U8R80D8L80":HPUT(25,35)
-(95,145),1:HCOLOR4:HPRINT(4,22)
,"HIT SPACEBAR TO TRY ANOTHER CH
ORD":HCOLOR8
110 HDRAW"C8BM=H;,=V;"+BX$:EXEC4
3345
120 X$=INKEY$:IFX$=""THEN120
130 HDRAW"C4BM=H;,=V;"+BX$
140 IF X$=CHR$(94)THENV=V-8
150 IF X$=CHR$(10)THENV=V+8
160 IF X$=CHR$(8)THENH=H-96
170 IF X$=CHR$(9)THENH=H+96
180 IF X$="Q" THEN 1020
190 IFX$=E$AND V=15AND H=135THEN
GOSUB960:GOTO600
200 IFX$=E$AND V=23AND H=135THEN
GOSUB960:GOTO610
210 IFX$=E$AND V=31AND H=135THEN
GOSUB960:GOTO620
220 IFX$=E$AND V=39AND H=135THEN
GOSUB960:GOTO630
230 IFX$=E$AND V=47AND H=135THEN
GOSUB960:GOTO640
240 IFX$=E$AND V=55AND H=135THEN
GOSUB960:GOTO650
250 IFX$=E$AND V=63AND H=135THEN
GOSUB960:GOTO660
260 IFX$=E$AND V=71AND H=135THEN
GOSUB960:GOTO670
270 IFX$=E$AND V=79AND H=135THEN
GOSUB960:GOTO680
280 IFX$=E$AND V=87AND H=135THEN
GOSUB960:GOTO690
290 IFX$=E$AND V=95AND H=135THEN
GOSUB960:GOTO700
300 IFX$=E$AND V=103AND H=135THE
NGOSUB960:GOTO710
310 IFX$=E$AND V=111AND H=135THE
NGOSUB960:GOTO720
320 IFX$=E$AND V=119AND H=135THE
NGOSUB960:GOTO730
330 IFX$=E$AND V=127AND H=135THE
NGOSUB960:GOTO740
340 IFX$=E$AND V=135AND H=135THE
NGOSUB960:GOTO750
350 IFX$=E$AND V=143AND H=135THE
NGOSUB960:GOTO760
360 IFX$=E$AND V=151AND H=135THE
NGOSUB960:GOTO770
370 IFX$=E$AND V=15AND H=231THEN
GOSUB960:GOTO780
380 IFX$=E$AND V=23AND H=231THEN
GOSUB960:GOTO790
390 IFX$=E$AND V=31AND H=231THEN
GOSUB960:GOTO800
400 IFX$=E$AND V=39AND H=231THEN
GOSUB960:GOTO810
410 IFX$=E$AND V=47AND H=231THEN
GOSUB960:GOTO820
420 IFX$=E$AND V=55AND H=231THEN
GOSUB960:GOTO830
430 IFX$=E$AND V=63AND H=231THEN
GOSUB960:GOTO840
440 IFX$=E$AND V=71AND H=231THEN
GOSUB960:GOTO850
450 IFX$=E$AND V=79AND H=231THEN
GOSUB960:GOTO860
460 IFX$=E$AND V=87AND H=231THEN
GOSUB960:GOTO870
470 IFX$=E$AND V=95AND H=231THEN
GOSUB960:GOTO880
480 IFX$=E$AND V=103AND H=231THE
NGOSUB960:GOTO890
490 IFX$=E$AND V=111AND H=231THE
NGOSUB960:GOTO900
500 IFX$=E$AND V=119AND H=231THE
NGOSUB960:GOTO910
510 IFX$=E$AND V=127AND H=231THE
NGOSUB960:GOTO920
520 IFX$=E$AND V=135AND H=231THE
NGOSUB960:GOTO930
530 IFX$=E$AND V=143AND H=231THE
NGOSUB960:GOTO940
540 IFX$=E$AND V=151AND H=231THE
NGOSUB960:GOTO950
550 IF V>151 THEN V=15
560 IF V<15 THEN V=151
570 IF H>231 THEN H=231
580 IF H<135 THEN H=135
590 GOTO 110
600 HCIRCLE(54,83),5:HCIRCLE(66,
83),5:HCIRCLE(78,83),5:GOSUB970:
GOTO100
610 HCIRCLE(54,83),5:HCIRCLE(66,
83),5:HCIRCLE(78,58),5:GOSUB970:
GOTO100
620 HCIRCLE(54,83),5:HCIRCLE(66,
83),5:HCIRCLE(78,83),5:HCIRCLE(9
0,108),5:GOSUB970:GOTO100
630 HCIRCLE(54,108),5:HCIRCLE(66
,108),5:HCIRCLE(78,108),5:HCIRCL
E(90,58),5:GOSUB970:GOTO100
640 HCIRCLE(54,108),5:HCIRCLE(66
,108),5:HCIRCLE(78,83),5:HCIRCLE
(90,58),5:GOSUB970:GOTO100
650 HCIRCLE(54,108),5:HCIRCLE(66
,58),5:HCIRCLE(78,108),5:HCIRCLE
(90,58),5:GOSUB970:GOTO100
660 HCIRCLE(54,133),5:HCIRCLE(66
,133),5:HCIRCLE(78,133),5:HCIRCL
E(90,83),5:GOSUB970:GOTO100
670 HCIRCLE(54,133),5:HCIRCLE(66
,133),5:HCIRCLE(78,108),5:HCIRCL
E(90,83),5:GOSUB970:GOTO100
680 HCIRCLE(42,83),5:HCIRCLE(54,
58),5:HCIRCLE(66,83),5:HCIRCLE(9
0,83),5:GOSUB970:GOTO100
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,83),5:HCIRCLE(78,58),5:GOSUB970
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:GOTO100
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720 HCIRCLE(54,108),5:HCIRCLE(66
,58),5:HCIRCLE(78,83),5:HCIRCLE(
90,58),5:GOSUB970:GOTO100
730 HCIRCLE(54,83),5:HCIRCLE(66,
58),5:HCIRCLE(78,83),5:GOSUB970:
GOTO100
740 HCIRCLE(54,108),5:HCIRCLE(66
,58),5:HCIRCLE(90,58),5:GOSUB970
:GOTO100
750 HCIRCLE(66,83),5:HCIRCLE(78,
108),5:HCIRCLE(90,83),5:GOSUB970
:GOTO100
760 HCIRCLE(66,83),5:HCIRCLE(78,
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:GOTO100
770 HCIRCLE(66,83),5:HCIRCLE(78,
58),5:HCIRCLE(90,83),5:GOSUB970:
GOTO100
780 HCIRCLE(54,58),5:HCIRCLE(66,
108),5:HCIRCLE(78,133),5:HCIRCLE
(90,108),5:GOSUB970:GOTO100
790 HCIRCLE(54,133),5:HCIRCLE(66
,108),5:HCIRCLE(78,133),5:HCIRCL
E(90,83),5:GOSUB970:GOTO100
800 HCIRCLE(54,58),5:HCIRCLE(66,
108),5:HCIRCLE(78,108),5:HCIRCLE
(90,108),5:GOSUB970:GOTO100
810 HCIRCLE(42,83),5:HCIRCLE(54,
83),5:HCIRCLE(66,58),5:GOSUB970:
GOTO100
820 HCIRCLE(42,83),5:HCIRCLE(54,
83),5:GOSUB970:GOTO100
830 HCIRCLE(42,83),5:HCIRCLE(54,
83),5:HCIRCLE(66,58),5:HCIRCLE(7
8,108),5:GOSUB970:GOTO100
840 HCIRCLE(54,108),5:HCIRCLE(66
,83),5:HCIRCLE(78,58),5:HCIRCLE(
90,58),5:GOSUB970:GOTO100
850 HCIRCLE(54,108),5:HCIRCLE(66
,58),5:HCIRCLE(78,58),5:HCIRCLE(
90,58),5:GOSUB970:GOTO100
860 HCIRCLE(54,58),5:HCIRCLE(66,
83),5:HCIRCLE(78,58),5:HCIRCLE(9
0,58),5:GOSUB970:GOTO100
870 HCIRCLE(54,133),5:HCIRCLE(66
,108),5:HCIRCLE(78,83),5:HCIRCLE
(90,83),5:GOSUB970:GOTO100
880 HCIRCLE(54,133),5:HCIRCLE(66
,83),5:HCIRCLE(78,83),5:HCIRCLE(
90,83),5:GOSUB970:GOTO100
890 HCIRCLE(54,83),5:HCIRCLE(66,
108),5:HCIRCLE(78,83),5:HCIRCLE(
90,83),5:GOSUB970:GOTO100
900 HCIRCLE(30,108),5:HCIRCLE(42
,83),5:HCIRCLE(90,108),5:GOSUB97
0:GOTO100
910 HCIRCLE(41,58),5:HCIRCLE(78,
108),5:HCIRCLE(90,108),5:GOSUB97
0:GOTO100
920 HCIRCLE(30,108),5:HCIRCLE(42
,83),5:HCIRCLE(90,58),5:GOSUB970
:GOTO100
930 HCIRCLE(54,58),5:HCIRCLE(66,
58),5:HCIRCLE(78,58),5:HCIRCLE(9
0,83),5:GOSUB970:GOTO100
940 HCIRCLE(54,58),5:HCIRCLE(66,
58),5:HCIRCLE(90,133),5:GOSUB970
:GOTO100
950 HCIRCLE(54,58),5:HCIRCLE(66,
58),5:HCIRCLE(78,58),5:HCIRCLE(9
0,83),5:GOSUB970:GOTO100
960 HDRAW"C8BM=H;,=V;"+BX$:HCOLO
R8,4:FORY=40TO140STEP25:HLINE(30
,Y)-(90,Y),PSET:NEXTY:FORX=30TO9
0STEP12:HLINE(X,40)-(X,140),PSET
:NEXTX:RETURN
970 HPRINT(4,22),"HIT SPACEBAR T
O TRY ANOTHER CHORD":HPRINT(13,2
3),"Hit <Q> to Quit
980 I$=INKEY$:IFI$=""THEN980
990 IF I$="Q"THEN 1020
1000 IF I$=CHR$(32)THEN RETURN
1010 GOTO 980
1020 POKE65496,0:WIDTH32:RGB:END
```

Color Computer Software from Cer-Comp Ltd.

Window Master V2.2

The hottest new program available for the Color Computer III! Now you can have Windows, Icons, Buttons, Pull-Down Menus, Edit Fields and Mouse Functions built into your Basic or Machine Language Programs easily and quickly, without the need for OS9.

It supports up to 31 Windows on the display, multiple fonts in 54 possible sizes and styles, Enhanced Basic Editing and much more. It adds over 50 Commands and Functions to Basic to fully support the Point & Click Window System. In fact it has so many features it would take several pages to to describe them all.

It is completely compatible with existing Basic programs and takes absolutely no memory away from Basic. It contains a built in Ram Disk which is completely transparent to Basic (512k version) for enhanced operation.

It requires 1 Disk Drive, R.S. Hi-Res Interface & Joystick or Mouse. Includes both the 128k & 512k versions for only $69.95

Window-Ware

Window Writer - A Point & Click Word Processor, features both Mouse & Keyboard type editing, proportional printer support, powerful formatting capability, works with any printer. On screen Italic, bold etc. WYSIWYG Requires Window Master & 512k- $59.95

Window Writer/W - for non Window Master users includes all features as described above. Requires 512K & Disk $79.95

Window Basic Compiler - A Basic Compiler similar to CBASIC only it compiles all the Window Basic statements to create super fast M.L. programs & Desk Accessory programs for Window Master $99.00

Window EDT/ASM - A full featured Editor/Assembler and Debugger for the Window Master System $49.95

Font/Icon Editors - A utility disk with the Font & Icon Editors so you can edit or create your own, includes Basic & M.L. versions $19.95

Advanced Programmers Guide - A Guide for Basic & M.L. Programmers on interfacing to Window Masters complete system including System Calls, Memory Map, Interrupt handling & Extended Memory access. $24.95

The Memory Game - A Concentration like game, lots of fun for everyone. $19.95

512K RAM UPGRADE

Give your COCO 3 all the power it deserves with this easy to install (no soldering/plug in) 100% Tandy compatible 512K memory upgrade. Completely assembled and tested. Includes Ramdisk & Memory Test software described below. $159.95, **512K + Window Master $199**

512K RAMDISK & TESTER

RAMDISK is an ALL Machine Language program that will give you 2 ULTRA High Speed Ram Disks in you CoCo-3. Plus it allows your CoCo-3 to run at double speed all the time even for disk access!!! It will not disappear when you press reset like some other ramdisk programs. The MEMORY tester is a fast ML program to test the 512K ram. It performs several bit tests as well as an address test.

Requires 512K & Disk $19.95

CBASIC Editor/Compiler

The ULTIMATE Color Computer BASIC COMPILER!!!

If you want to write fast efficient machine language programs and you don't want to spend the next few years trying to learn how to write them in Assembly language or with a cheap compiler, then CBASIC is the answer!!!

CBASIC is the only fully integrated Basic Compiler and Program Editing System available for the Color Computer. It will allow you to take full advantage of all the capabilities available in your CoCo without having to spend years trying to learn assembly language programming. CBASIC allows you to create, edit and convert programs from a language you are already familiar with Enhanced Disk Color Basic, into fast efficient machine language programs easily and quickly.

CBASIC supports all the enhanced hardware available in the CoCo 2 & 3, including Hi-Res Graphics, & Screen displays, Extended Memory and Interrupts. We even added advanced commands not available in Basic to give you a level of control only available to very advanced Machine Language Programmers. Plus we made it exceptionally easy to use, not like some other compilers. CBASIC is the friendliest and easiest compiler available for the Color Computer.

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. CBASIC features well over 150 Compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. It supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics H/GET, H/Put, H/Play and H/DRAW, all with 99.9% syntax compatibility.

CBASIC makes full use of the powerful and flexible GIMI chip in the Color Computer 3. It will fully utilize the 128K of RAM available and install 2 Ultra Fast Ramdisks if 512K is available, for program Creation, Editing and Compilation. You can easily access all 512K of memory in a Compiled program thru several extended memory commands that can access it in 32K or 8K blocks and single or double bytes.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing Basic programs. It has block move and copy, program renumbering, automatic line number generation, screen editing, printer control and much more.

Coco 1,2 or 3 Disk $149.00

To order products by mail, send check or money order for the amount of purchase, plus $3.00 for shipping & handling to the address below.

To order by VISA, MASTERCARD or COD call us at (702) 452-0632

(Monday thru Saturday, 8am to 5pm PST).

CER-COMP Ltd.
5566 Ricochet Avenue
Las Vegas, Nevada 89110
702-452-0632

DataPack III Plus V1.1

SUPER SMART TERMINAL PROGRAM
AUTOPILOTand AUTO-LOG Command Processors
X-MODEM DIRECT DISK FILE TRANSFER
VT-100 & VT-52 TERMINAL EMULATION

- No lost data even at 2400 Baud on the Serial port.
- 8 Selectable Display Formats, 32/40/64/80 columns
- ASCII & BINARY disk file transfer via XMODEM.
- Directly record receive data (Data Logging).
- VT-100 emulation for VAX, UNIX and other systems.
- VT-100/52 cursor keys ,position,, PF & Alt. Kbd. keys.
- Programmable Word Length, Parity, Stop Bits .
- Complete Full and Half Duplex operation,
- Send full 128 character set from Keyboard
- Complete Editor, Insert, Delete, Change or Add.
- 9 Variable length, Programmable Macro Key buffers.
- Programmable Printer rates from 110 to 9600 Baud.
- Send Files from the Buffer, Macro Keys or Disk.
- Display or Print the contents of the 50k Buffer.
- Freeze Display & Review information On line.
- Built in Command Menu (Help) Display.
- Built in 2 Drive RAMDISK for 512K RAM.

Supports: R. S. Modem-Pak & Deluxe RS-232 Pak.

Coco 1, 2 or 3 Disk - $59.95

"The SOURCE"

DISASSEMBLER & SOURCE CODE GENERATOR

The SOURCE will allow you to easily & quickly Disassemble Color Computer machine language programs Directly from Disk and generate beautiful, Assembler Source code.

- Automatic label generation.
- Allows specifying FCB, FDB and FCC areas.
- Disassemble programs Directly from disk.
- Automatically locates address.
- Output listings to the Printer, Screen or both.
- Generates Assembler source directly to disk.
- Built in Hex/Ascii dump/display.
- 8 Selectable Display formats 32/40/64/80 .
- Selectable Foreground & Background colors.
- Built in Disk Directory an Kill file commands.
- Menu display with single key commands.
- Written in Ultra Fast Machine Language.

Coco 1, 2 or 3 Disk $49.95

EDT/ASM III

DISK EDITOR ASSEMBLER

EDT/ASM III is a Disk based co-resident Text Editor & Assembler. It is designed to take advantage of the new features available in the CoCo-3 with either 128K or 512K of memory. It has 8 display formats from 32/40/64/80 columns. There is also a free standing ML Debug Monitor.

EDT/ASM III has the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer.

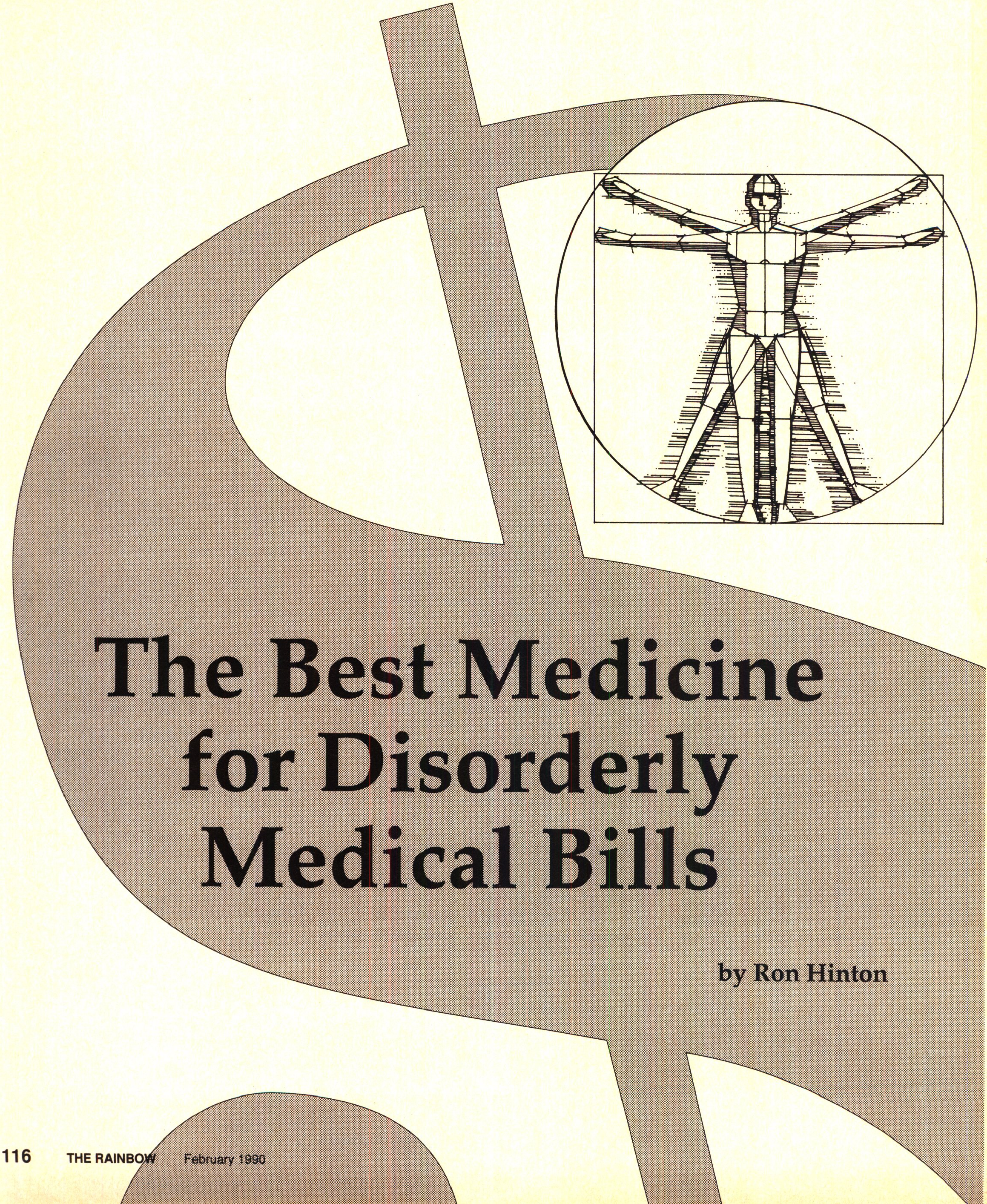
- Local and Global string search and/or replace.
- Full Screen line editing .
- Easy to use Single key editing commands.
- Load & Save standard ASCII formatted files.
- Block Move & Copy, Insert, Delete, Overtype.
- Create and Edit files larger than memory.

The Assembler features include:

- Supports Conditional IF/THEN/ELSE assembly.
- Supports Disk Library file up to 9 levels deep.
- Supports standard Motorola directives.
- Allows multiple values in FCB & FDB directives
- Allows assembly from the Buffer, Disk or both.

Coco 1, 2 or 3 Disk $59.95

Keeping the financial side of your medical history in order



The Best Medicine for Disorderly Medical Bills

by Ron Hinton

Don't let medical bills slow you down. Take charge with *Medic3*, a program that lets you keep track of payments for treatment and prescriptions as well as insurance credits.

I originally wrote *Medic3* on a CoCo 1, with a 51-column screen driver called *Bytescreen*, and have been using it for over three years. It has been especially helpful during tax time. You can instantly print out a list of all your medical visits, prescriptions, amounts paid and insurance received. While my wife and I were caring for foster children, it was helpful to have a printout of their yearly medical visits and expenses. Recently I obtained an RGB monitor and rewrote the program to take full advantage of the 80-column screen, colors and new features of the CoCo 3.

After running the program, choose Option 7 to begin a new record and follow the prompts, pressing ENTER after each entry. First you enter the current year. You have to do this only once when you set up your file for the year. Then enter the name of the patient. At the Service prompt enter what was performed, such as "Check-up - X-ray - Blood Pressure 98/120 - Dr. Jackson." You must limit the length of your input to 45 characters. If you exceed the limit, there is a beep and you have to reenter the service.

To keep track of prescriptions I just enter `PRESC` at the name prompt. For Service I enter the type of drug, what it's for and who it was for, such as "Amoxicillin 250mg/antibiotic/Jeremy." Then you can simply type `PRESC` when using Option 2, List By Name, and get an immediate list of all the prescriptions your family used during the year and how much you spent.

Enter the date in MM/DD format. For Amount enter the amount you just paid. The Insurance field can be left blank and updated later when you receive a statement from your insurance company.

Medic3 automatically sets the computer for all uppercase in the Name field and lowercase in the Service field. If a different combination is used for the name, the program would treat them as different files when retrieving them. You still have to be sure to spell the names the same each time.

When you have finished with the current entries, press N for "Any More Entries?" This takes you back to the main menu where you can select Save, List All Records, List By Name, Print, etc. Option 1, List All Records, lists all the items in your file to the screen. You can print all entries or only one person's file to the printer just as you can with the screen. Make sure the printer is ready and follow the prompts.

Modifications

The print routine uses `POKE150,7`. This sets you to 9600 baud at double speed so you don't have to slow the computer down to print. If your printer doesn't run at 9600 baud, edit Line 4005 to `POKE150,40` for 2400 or `POKE150,180` for 600 baud. The printer codes are for an NX-10. Change lines 5015, 5040, 6030 and 6060 to your printer codes for double-high or expanded print.

Operating Hints

When using Option 3, Edit, you are asked for the file number to edit. This can be found by listing all records and noting the number of the one you want to edit. After the program finds the file, you are

---

Ron Hinton is an operator at an electrical generating plant. He got his first CoCo in 1982 and learned BASIC programming from THE RAINBOW. He can be contacted at 50339 Stagecoach Rd., East Liverpool, OH 43920. Please enclose an SASE when requesting a reply.

ALPHA SOFTWARE TECHNOLOGIES

COMM - 4

ATTENTION!!! Alpha software technologies has teamed up with COCO devices to bring you the incredible COMM - 4 port! 4 ports in one slot! That's right, up to 4 users at one time! Special pulsed IRQ line helps to prevent lockups! External IRQ line allows you to connect to an IRQ hack mod. Totally compatible 6551 technology, no special drivers needed! Comes complete with networking software that allows multiple computers to share peripherals! A must for any BBS user! A perfect match for OS9 Level II BBS! $124.95

OS9 Level II BBS Release 3.0

System comes complete and ready to run. Use the build in menus or create your own. Run your own programs or games on- line! Complete message system included. File transfer system supports Xmodem and Ymodem plus automatic validation with keyword searching! Even comes with its own terminal program free! Now includes ANSI graphics menus and editor! See board while it runs! For a DEMO call (504)649-5761 (3/12/2400 Baud). Galactic Conflict game also included!
512k OS9 Level II and RS-232 (or COMM-4) pak required........ $ 29.95

Presto - Partner

This is what you have been waiting for! Finally RAM-Resident software for your COCO 3! Runs in the background while you do other work! Includes a note-pad that does automatic number calculations, a calendar with alarm, a phone book that can auto-dial your phone, a real-time clock and much, much, more! This program will organize your entire life! 512k OS9 Level II Required (Hayes compatible modem required for auto-dial) 512k OS9 Level II Required........ $ 29.95

Level II Tools

Without the right tools OS9 is difficult...These ARE the right tools! With these great utilities anyone can use OS9 like a pro! Complete wildcard, tree and windowing commands make OS9 easy to use! If you want to start using OS9, this is what you need! If you already use OS9, these tools will save you hours of time and headaches!
25 great utilities in one package........ $ 24.95

Disk Manager Tree

This versatile utility makes your OS9 life a breeze! No more fighting with complex directory structures! No more searching for files and typing long path names! Everything is displayed using windows! Allows you to change, create, and delete directories with single keystrokes! Also allows you to copy, view and delete files just as easily! A must for the OS9 beginner. A great time saver for the experienced OS9 user. Save hours of time and headaches! 512k OS9 Level II Required........ $ 29.95

Multi - Menu

This great Multi-Vue utility allows you to easily create your own pop-down menus! No programming experience is required, because no programming is done! You will be able to run any OS9 command or program from a menu! Menu creation is super simple, super easy! Actually see the menu as it develops. A must for Multi-Vue users! Make that non Multi-Vue software run in Multi-Vue! 512k OS9 Level II and Multi-Vue required........ $ 19.95

Warp-One

Finally, a complete OS9 Level II windowing terminal program. Many features include Auto-dial & macro, X & Y modem, ANSI graphics, buffer capture, on-line timer, chat mode, windows, and much, much, more! Perfect for any BBS user! More power that you'll ever need! 512k OS9 Level II & RS-232 Pak Required........ $ 34.95

The Zapper

This wonderful utility allows you to patch anything! Patch commands directly on disk and fix CRCs automatically! Patch the OS9 Boot file! Save lost files! Fix crashed disks! One use of this program could be worth the price! 64k OS9 Level I or II required........ $ 19.95

Send check or money order to: Alpha Software Technologies, 1500 I-10 Service Rd. #61, Slidell, LA. 70461 ....(504)649-5176 (voice)
........(504)649-5761 (BBS)

Please add $3.00 Shipping and handling, all orders shipped same day via first class mail. Most orders arrive in 2 to 3 days. COD orders add $2.50 extra.

asked which field you want to change. Just press the number and enter the new data, after which time you can choose a new field or return to the menu.

Be sure to save your file with Option 6 after all updates. Your file is saved with the current year as its name. This allows several years to be filed on the same disk. The next time you use *Medic3*, pick Option 5 and enter the year you want to see. You need only to enter the last two digits of the year (90 for 1990). It doesn't matter if you forget because the program automatically chops off and uses the last two digits of the number. You then return to the main menu again to View, Print, Edit, etc. I like to keep a backup of my file data on a separate disk. This way if something happens while I am updating, I don't lose all my work.

Any time you want to leave an option, just press BREAK and you are returned to the main menu. But don't do this during disk access or you might lose your file. There is extensive error trapping, thanks to the new commands on the CoCo 3, such as `ON BRK GOTO` and `ON ERR GOTO` that make this program a lot easier to use. If the disk is full when saving, you are prompted to insert a new formatted disk. Remember, formatting erases everything in your memory, so it is a good idea to always have a newly formatted disk handy. ❑

CoCo 3 Disk

40	73
95	220
200	145
282	246
320	229
430	13
561	96
615	241
624	145
710	143
800	138
874	176
985	221
1080	30
1140	226
1156	234
1200	191
1410	188
1445	239
1486	24
1590	245
1650	97
4020	90
5045	107
5170	18
6060	11
6200	182
10000	200
END	241

The Listing: `MEDIC3`

```
0 'COPYRIGHT 1989, FALSOFT INC.
1 '****************************
2 '*          MEDIC3          *
3 '*                          *
4 '*        RON HINTON        *
5 '*     50339 STAGECOACH     *
6 '*   E.LIVERPOOL, OH 43920  *
7 '*     (c)opyright 1989     *
8 '****************************
9 V=10:H=6:Y=00
10 PALETTERGB:PALETTE14,9:PALETT
E1,0:PALETTE10,55:PALETTE13,45
15 GOTO40
20 LOCATE TA+1,1:ATTR7,1:PRINT"M
EDICAL RECORDS";Y:LOCATE0,3:ATTR
3,1:PRINTPR$:RETURN
40 CLEAR5000
50 DIM I(150),N$(150),S$(150),D$
(150),A(150),IN(150)
55 ONBRKGOTO90:ONERRGOTO10000
60 W$="$####.##"
70 X$="$$####.##"
80 W=80 'CHANGE TO 40 FOR COMPOS
ITE OR TV
81 IF W=40 THENPALETTECMP: PALET
TE14,25:PALETTE1,0:PALETTE10,38:
PALETTE13,45
82 PR$=STRING$(W,"-")
85 POKE65497,0
86 WIDTH W
90 CLS2:IF W=80THEN TA=30ELSE TA
=12:GOSUB 20
92 GOSUB20
95 V=30:H=6
120 ATTR3,1:LOCATETA,H:PRINT" 1)
 LIST ALL RECORDS"
130 PRINT:PRINTTAB(TA)" 2) LIST
BY NAME"
140 PRINT:PRINTTAB(TA)" 3) EDIT
RECORDS"
150 PRINT:PRINTTAB(TA)" 4) ADD R
ECORDS"
160 PRINT:PRINTTAB(TA)" 5) LOAD"
170 PRINT:PRINTTAB(TA)" 6) SAVE"
180 PRINT:PRINTTAB(TA)" 7) BEGIN
 NEW RECORD"
190 PRINT:PRINTTAB(TA)" 8) PRINT
"
200 PRINT:PRINTTAB(TA)" 9) EXIT"
210 A$=INKEY$:IFA$=""THEN210
215 K=VAL(A$):IF K<1 OR K>9 THEN
80
220 ON K GOTO500,1360,1010,440,8
90,850,250,4000,12000
240 SOUND100,1:GOTO80
250 CLS:LOCATE5,5:ATTR7,1:INPUT
" Enter Year...";Y
255 I=0
260 CLS
270 I=I+1
280 GOSUB20
282 IF W=80 THEN TA=20ELSE TA=10
285 LOCATETA,H
290 PRINT "Item Number";(I):ATTR
1,1
295 PRINT
300 POKE282,255:PRINTTAB(TA)"Nam
e.......";:ATTR3,1:INPUT N$(I):A
TTR1,1
305 IF W=80THEN LOCATE78,10:ATTR
6,1:PRINTCHR$(125):ATTR1,1
310 POKE282,0:LOCATE TA,10:PRINT
"Service....";:ATTR3,1:LINEINPUT
 S$(I):ATTR1,1
312 IF LEN(S$(I)) >45 THEN SOUND
100,2:ATTR6,1,B:PRINT"
         ** STRING TOO LONG! TR
Y AGAIN **":FORQ=1TO200:NEXT:GOT
O305
315 POKE282,255
320 PRINT:PRINTTAB(TA)"Date.....
..";:ATTR3,1:INPUTD$(I):ATTR1,1
330 PRINT:PRINTTAB(TA)"Amount...
..";:ATTR3,1:INPUT A(I):ATTR1,1
340 PRINT:PRINTTAB(TA)"Ins. Rec'
vd";:ATTR3,1:INPUT IN(I):ATTR1,1
350 PRINT:PRINT:T=0:C=0
360 IF I>149THEN410
365 LOCATETA-10,H+15:ATTR7,1
370 PRINT" DO YOU WISH TO ENTER
MORE  ITEMS INTO THE RECORDS? <Y
/N>"
380 A$=INKEY$:IFA$=""THEN380
390 IF A$="N"THEN450
395 IF A$="n"THEN450
400 GOTO260
410 LOCATE35,15
420 ATTR7,1,B:PRINT I;" ITEMS":L
OCATE35,H+17:PRINT"BUFFER FULL"
430 SOUND200,1:FORQ=1TO300:NEXT:
GOTO80
440 CLS:GOTO270
450 Z=I:GOTO80
500 CLS
510 T=0:C=0:H=6:I=1
530 GOSUB20
535 LOCATE V-27,5:ATTR7,1
540 IF W=80THENPRINT"  NAME
DATE                    SERVICE
                           AMOUNT"
545 IF W=40THENPRINT" NAME  DATE
    AMOUNT         SERVICE"
550 ATTR3,1:PRINT
555 IF W=40THEN565ELSE560
560 IF W=80THEN LOCATE0,H+I:PRIN
TI;
561 LOCATE4,H+I:PRINTN$(I);
562 LOCATE14,H+I:PRINTD$(I);
563 ATTR2,1:LOCATE22,H+I:PRINTS$
(I);
564 ATTR3,1:LOCATE68,H+I:PRINTUS
ING W$;A(I):GOTO570
565 IF W=40THEN PRINTI;
566 PRINTN$(I);
567 PRINTTAB(2)D$(I);
568 PRINTTAB(2);:PRINTUSING W$;A
(I)
569 ATTR2,1:PRINTS$(I):ATTR3,1
570 T=T+A(I)
580 C=C+IN(I)
590 IF LEN(N$(I))=0THEN I=I-1:GO
TO640
610 I=I+1
615 IF I=7AND W=40GOTO800ELSEIF
I=14THEN H=-7:GOTO710
616 IF I=21AND W=40GOTO802ELSE I
F I=28THEN H=-21:GOTO710
617 IF I=35AND W=40GOTO804ELSEIF
 I=42THEN H=-35:GOTO710
618 IF I=49AND W=40GOTO806ELSEIF
 I=56THEN H=-49:GOTO710
```

```
619 IF I=63ANDW=40GOTO808ELSEIF
I=70THEN H=-63:GOTO710
620 IF I=77ANDW=40GOTO810ELSEIF
I=84THEN H=-77:GOTO710
621 IF I=91ANDW=40GOTO812ELSEIF
I=98THEN H=-91:GOTO710
622 IF I=105ANDW=40GOTO814ELSEIF
 I=112THEN H=-105:GOTO710
623 IF I=119ANDW=40GOTO816ELSEIF
 I=126THEN H=-119:GOTO710
624 IF I=133ANDW=40GOTO818ELSEIF
 I=140THEN H=-133:GOTO710
625 IF I=147ANDW=40GOTO820ELSEIF
 I=154THEN H=-147:GOTO710
626 IF I=161ANDW=40GOTO822ELSEIF
 I=168THEN H=-161:GOTO710
630 GOTO555
640 ATTR7,1:PRINT:PRINT " TOTAL
    :       ";
650 ONERRGOTO10000:PRINTUSING X$
;T
670 PRINT:PRINT" INSURANCE  :
   ";
680 PRINTUSING X$;C
690 PRINT:PRINT" BALANCE    :
   ";
700 PRINTUSING X$;T-C
705 ATTR3,1:GOTO760
710 ATTR7,1:PRINT"PRESS ANY KEY
TO CONTINUE"
715 ONBRKGOTO90
720 A$=INKEY$
730 IF A$=""THEN720
740 CLS
750 GOTO530
760 PRINT:PRINT"PRESS <ENTER> FO
R MENU"
765 ONBRKGOTO90
770 A$=INKEY$:IF A$=""THEN770
780 Z=I:GOTO80
790 ONERR GOTO10000:CLS:Z=I
800 H=0:GOTO710
802 H=-14:GOTO710
804 H=-28:GOTO710
806 H=-35:GOTO710
808 H=-56:GOTO710
810 H=-70:GOTO710
812 H=-84:GOTO710
814 H=-98:GOTO710
816 H=-112:GOTO710
818 H=-126:GOTO710
820 H=-140:GOTO710
822 H=-154:GOTO710
850 ONERR GOTO10000:CLS:Z=I
860 YR$=STR$(Y)
865 OPEN"O",#1,YR$
868 PRINT#1,Y,Z
870 FOR I=1TO Z
872 WRITE#1,N$(I),S$(I),D$(I),A(
I),IN(I)
874 NEXTI
880 CLOSE#1
885 GOTO80
890 CLEAR5000:CLS
892 DIM I(150),N$(150),S$(150),D
$(150),A(150),IN(150)
893 ONERR GOTO10000
894 W$="$####.##":X$="$$####.##"
895 PRINT:PRINT"What year do you
 wish to load";
896 INPUT YR
900 YR$=STR$(YR)
950 IF LEN(YR$)>2 THEN YR$=CHR$(
32)+RIGHT$(YR$,2)
975 OPEN"I",#1,YR$
978 INPUT#1,Y,Z
980 FORI=1TO Z
985 INPUT#1,N$(I),S$(I),D$(I),A(
I),IN(I)
987 NEXTI
995 CLOSE #1
1000 I=I-1:GOTO80
1010 CLS
1020 GOSUB20:V=10:H=6:LOCATEV,H
1030 PRINT"ENTER NUMBER OF ITEM
";
1035 IF W=40THEN V=1
1040 INPUT N
1050 LOCATEV,H+2:PRINT"WHICH ENT
RY DO YOU WANT CHANGED?"
1060 LOCATEV+5,H+4:ATTR1,1
1070 PRINT" 1) NAME      : "N$(N)
1080 PRINTTAB(V+5)" 2) SERVICE
: "S$(N)
1090 PRINTTAB(V+5)" 3) DATE
: "D$(N)
1100 PRINTTAB(V+5)" 4) AMOUNT
: "A(N)
1110 PRINTTAB(V+5)" 5) INSURANCE
: "IN(N)
1111 ATTR6,1:PRINT:PRINTTAB(V+5)
" 6) ABORT":ATTR3,1
1120 A$=INKEY$:IFA$=""THEN1120
1125 E=VAL(A$):IF E<1 OR E>6 THE
N1050
1129 IFW=40THEN V=21
1130 ON E GOTO 1140,1150,1160,11
70,1180,80
1140 IF W=80THEN LOCATEV+19,H+4E
LSE IF W=40THEN LOCATEV-1,H+4:AT
TR6,1:POKE282,255:INPUTN$(N):ATT
R1,1:GOTO1200
1142 ATTR6,1:POKE282,255:INPUTN$
(N):ATTR1,1:GOTO1200
1150 IF W=80THEN LOCATEV+19+47,H
+5:ATTR6,1:PRINTCHR$(125):LOCATE
V+19,H+5:POKE282,0:LINEINPUTS$(N
```

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```
):ATTR1,1:POKE282,255
1152 IF W=40THENLOCATEV,H+5:ATTR
6,1:POKE282,0:LINEINPUTS$(N):ATT
R1,1:POKE282,255
1155 IF LEN(S$(N))>45 THENSOUND1
00,2:ATTR6,1:PRINT:PRINT"
          ** STRING TOO LONG! UN
DER 45 CHARS. **":FORQ=1TO250:NE
XT:GOTO1150
1156 GOTO1200
1160 IF W=80THEN LOCATEV+19,H+6E
LSE IF W=40THEN LOCATEV-1,H+7:AT
TR6,1:INPUT D$(N):ATTR1,1:GOTO12
00
1162 ATTR6,1:INPUT D$(N):ATTR1,1
:GOTO1200
1170 IF W=80THEN LOCATEV+19,H+7E
LSE IF W=40 THEN LOCATEV-1,H+8:A
TTR6,1:INPUT A(N):ATTR1,1:GOTO12
00
1172 ATTR6,1:INPUT A(N):ATTR1,1:
GOTO1200
1180 IF W=80THEN LOCATEV+19,H+8E
LSE IF W=40THEN LOCATE V-1,H+9:A
TTR6,1:INPUT IN(N):ATTR1,1:GOTO1
200
1182 ATTR6,1:INPUT IN(N):ATTR1,1
:GOTO1200
1200 IF W=80THEN LOCATE10,19ELSE
LOCATE5,19
1205 PRINT"<A>nother change
  <M>enu"
1210 A$=INKEY$:IFA$=""THEN1210
1220 IFA$="A"THEN1240ELSE1230
1230 T=0:C=0:Z=I:GOTO80
1240 LOCATE4,19:ATTR4,1:PRINT"

":GOTO1120
1360 CLS 'LIST BY NAME
1370 T=0:C=0: V=10:HO=6:R=0:I=0:
WI=1
1380 GOSUB20:LOCATE2,4:PRINT "NA
ME: ";
1390 ATTR6,1:INPUTP$:ATTR3,1
1410 IF W=80THEN LOCATE4,6:PRINT
"DATE                        SER
VICE                        AMOU
NT  INSURANCE"
1415 IF W=40THENLOCATE4,6:PRINT"
DATE   AMOUNT     INS.       SER
VICE"
1420 FOR I=1TOZ
1430 IF N$(I)=P$ THEN 1435ELSE15
10
1435 IF W=80GOTO1440ELSE1445' IF
 W=40 GOTO1445
1440 IF W=80THEN LOCATE0,HO+WI:P
RINTI:LOCATE4,HO+WI:PRINT D$(I):
ATTR2,1:LOCATE13,HO+WI:PRINT S$(
I):ATTR3,1:LOCATE61,HO+WI:PRINTU
SING W$;A(I):LOCATE71,HO+WI:ATTR
5,1:PRINTUSING W$;IN(I):ATTR3,1
1445 IF W=40THENPRINTI;:PRINTTAB
(1) D$(I);:PRINTTAB(1);:PRINTUSI
NG W$;A(I);:PRINTTAB(1);:ATTR5,1
:PRINTUSING W$;IN(I):ATTR2,1:PRI
NT S$(I):ATTR3,1
1475 R=R+1:A=A+1:WI=WI+1
1480 IF R=7ANDW=40GOTO1620ELSEIF
 R=14THEN HO=-8:GOTO1640
1481 IF R=21ANDW=40GOTO1622ELSEI
F R=28THEN HO=-22:GOTO1640
1482 IF R=35AND W=40GOTO1624ELSE
IF R=42THEN HO=-35:GOTO1640
1483 IF R=49AND W=40GOTO1626ELSE
IF R=56THEN HO=-50:GOTO1640
1484 IF R=63AND W=40GOTO1628ELSE
IF R=70THEN HO=-64:GOTO1640
1485 IF R=77AND W=40GOTO1630ELSE
IF R=84THEN HO=-78:GOTO1640
1486 IF R=91AND W=40GOTO1632ELSE
IF R=98THEN HO=-92:GOTO1640
1487 IF R=105AND W=40GOTO1634ELS
EIF R=112THEN HO=-106:GOTO1640
1490 T=T+A(I)
1500 C=C+IN(I)
1510 NEXTI
1530 ATTR7,1:PRINT:PRINT"  TOTAL
     : ";
1540 PRINTUSING X$;T
1550 PRINT:PRINT"  INSURANCE : "
;
1560 PRINTUSING X$;C
1570 PRINT:PRINT"  BALANCE   : "
;
1580 PRINTUSING X$;T-C
1585 ATTR3,1
1590 A$=INKEY$
1600 IF A$=""THEN1590
1610 Z=I:GOTO80
1620 HO=0:GOTO1640
1622 HO=-14:GOTO1640
1624 HO=-28:GOTO1640
1626 HO=-42:GOTO1640
1628 HO=-56:GOTO1640
1630 HO=-70:GOTO1640
1632 HO=-84:GOTO1640
1634 HO=-98:GOTO1640
1640 ATTR7,1:PRINT"PRESS ANY KEY
 TO CONTINUE"
1641 A$=INKEY$
1650 IFA$=""THEN1641
1651 ATTR3,1
1658 IFW=40 THENCLS:GOSUB20:LOCA
TE3,4:ATTR6,1:PRINTP$:ATTR3,1:LO
CATE4,6:PRINT"DATE   AMOUNT   IN
S.     SERVICE"
1660 GOTO1430
1669 IF W=80THENCLS:GOSUB20:LOCA
TE3,4:ATTR6,1:PRINT P$:ATTR3,1:L
OCATE4,6:PRINT"DATE
            SERVICE
          AMOUNT  INSURANCE"
4000 CLS
4005 POKE150,7' 9600BAUD AT DOUB
LE SPEED
4006 IF W=80THENV=30ELSEV=10
4010 GOSUB20:PRINT:PRINTTAB(V)"1
> PRINT ALL RECORDS":PRINT:PRINT
TAB(V)"2> PRINT BY NAME":PRINT:P
RINTTAB(V)"3> MAIN MENU"
4020 PRINT:PRINT:PRINTTAB(V+2)"<
 PRESS ONE >"
4030 A$=INKEY$:IF A$=""THEN4030
4040 IFA$="1"THEN 5000
4050 IFA$="2"THEN6000
4055 IF A$="3"THEN80
4060 GOTO4030
5000 T=0:C=0
5010 I=1
5015 PRINT#-2,CHR$(27);CHR$(104)
;CHR$(1):PRINT#-2,TAB(10)"MEDICA
L RECORDS  ";Y
5030 PRINT#-2,STRING$(40,"-")
5040 PRINT#-2,CHR$(27);CHR$(104)
;CHR$(0);:PRINT#-2,"        NAME
  DATE                    SERVIC
E                           AMOU
NT"
5045 PRINT#-2,STRING$(80,"-")
5050 PRINT#-2,I;:PRINT#-2,TAB(5)
N$(I);:PRINT#-2,TAB(14)D$(I);:PR
INT#-2,TAB(23)S$(I);
5060 T=T+A(I)
5070 C=C+IN(I)
5080 IF LEN(N$(I))=0THEN I=I-1:G
OTO5160
5090 PRINT#-2,TAB(70);:PRINT#-2,
USING W$;A(I)
5100 I=I+1
5150 GOTO5050
5160 PRINT#-2:PRINT#-2:PRINT#-2,
"     TOTAL:           ";
5170 PRINT#-2,USING X$;T
5180 PRINT#-2
5190 PRINT#-2,"     INSURANCE:
     ";
5200 PRINT#-2,USING X$;C
5210 PRINT#-2
5220 PRINT#-2,"     BALANCE:
     ";
5230 PRINT#-2,USING X$;T-C
5240 Z=I:GOTO80
6000 T=0:C=0
6010 PRINT"NAME: ";
6020 INPUTP$
6030 PRINT#-2,CHR$(27);CHR$(104)
;CHR$(1):PRINT#-2,TAB(10)"MEDICA
L RECORDS";Y
6035 PRINT#-2,STRING$(40,"-");
6040 PRINT#-2,CHR$(27);CHR$(104)
;CHR$(0);:PRINT#-2,TAB(3)P$
6060 PRINT#-2,"   DATE
           SERVICE
            AMOUNT   INS/REC."
6070 PRINT#-2,STRING$(80,"-")
6080 FOR I=1TO Z
6090 IF N$(I)=P$THEN6100ELSE6180
'
6100 PRINT#-2,TAB(3)D$(I);:PRINT
#-2,TAB(12)S$(I);
6110 PRINT#-2,TAB(59);
6120 PRINT#-2,USING W$;A(I);
6130 PRINT#-2,TAB(70);:
6140 PRINT#-2,USING W$;IN(I)
6150 R=R+1:A=A+1
6160 T=T+A(I)
6170 C=C+IN(I)
6180 NEXTI
6190 PRINT#-2:PRINT#-2
6200 PRINT#-2,"    TOTAL:
";
6210 PRINT#-2,USING X$;T
6220 PRINT#-2
6230 PRINT#-2,"    INSURANCE:
";
6240 PRINT#-2,USING X$;C
6250 PRINT#-2:GOTO6260
6260 PRINT#-2,"    BALANCE:
";
6270 PRINT#-2,USING X$;T-C
6280 Z=I:GOTO80
10000 IF ERNO=26THEN LOCATE24,5:
ATTR6,1,B:PRINT"*** FILE NOT ON
DISK ***":FORQ=1TO500:ATTR3,1:NE
XT:GOTO895
10005 IF ERNO=28 AND ERLIN=865TH
EN LOCATE28,8:ATTR6,1,B:PRINT"**
 DISK FULL **":ATTR6,1:LOCATE20,
10:PRINT"Press any key to return
 to menu":LOCATE20,12:PRINT"and
save file to a different disk":E
XEC44539:GOTO80
10010 PRINTERNO:PRINT ERLIN:PRIN
T"PRESS ANY KEY FOR MENU":EXEC44
539:GOTO80
12000 CLS:PRINT"BE SURE TO SAVE
CURRENT FILE":PRINT:PRINT"ARE YO
U SURE":INPUT S$
12010 IF S$="Y"THEN13000ELSE80
13000 POKE65496,0:NEW
```

Dissecting the Command Line

by Greg Law
Technical Editor

This month we are going to change the pace a little and examine one of the techniques for parsing (accepting and processing) command line parameters in C. This is usually easy but can be frustrating, especially when you are attempting to obtain several arguments along with options and modifiers. With a little effort, however, it can be relatively painless. To demonstrate this, I have written a small utility similar to `dir`. The difference is that `dir` lists all files in the directory, and `udir` lists only the filenames you specify on the command line. Also, any options must be given on the command line prior to the list of filenames. Options you can specify are: `-e` to get an extended directory (the default) or `-u` to get a directory listing with only one filename per line. Also, you can specify `-s` to append a slash to all directory names.

By accepting a list of filenames on the command line, you can use it with wildcards provided by *Shell+*. For example, if you want an extended directory listing of all files in the directory with directory names slashed, you type:

`udir -e -s *` or `udir -es *`

Allowing the options to be specified as a single argument, as in `-es`, provides for greater flexibility but also adds a little complication to the command line parsing.

Parsing the Command Line

The C compiler passes command line arguments as an array of strings to `argv` in `main()` and puts the count of total arguments in `argc`. For example, if you execute:

```
udir -es /dd/cmds/shell /dd/cmd
s/echo
```

the `argv` array looks like:

```
argv[0] = “udir\0”
argv[1] = “-es\0”
argv[2] = “/dd/cmds/shell\0”
argv[3] = “/dd/cmds/echo\0”
argv[4] = “\0”
```

`argc` contains the value 4, meaning there are four elements in the array. Keep in mind that `\0` is the null character used by C to terminate strings. The first element in the array is the name of the program, which is usually not needed although there are exceptions to every rule.

The easiest method to parse the command line is to use a simple loop, counting from one to `argc-1` and examining each element in the array. This is easy if we want only a list of filenames but impractical for deciphering any requested options. Take a look at the listing while we step through it.

The function `main` accepts two parameters: the argument counter, `argc`, and the argument vector, `argv` (an array of pointers). Once inside the function, a character pointer is declared and the printing routines for long integers are included with the statement `pflinit()`. The actual parsing routine is in the next few lines of code and I'll describe how it works.

The argument counter is decremented and compared with zero. If no arguments are given on the command line, the loop terminates. The next step, ++`argv`, increments the argument vector to point to the next command line argument. This works in such a way that `argv` initially points to the beginning of the array (`argv[0]`). An increment causes it to point to the next array item (`argv[1]`) and causes that item

```
argv->     argv[0]->    "udir\0"
           argv[1]->    "-es\0"
           argv[2]->    "/dd/cmds/shell\0"
           argv[3]->    "/dd/cmds/echo\0"
           argv[4]->    "\0"
```

Figure 1: Initial Argument Vector

```
           argv[-1]->   "udir\0"
argv->     argv[0]->    "-es\0"
           argv[1]->    "/dd/cmds/shell\0"
           argv[2]->    "/dd/cmds/echo\0"
           argv[3]->    "\0"
```

Figure 2: First Increment of argv

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

The Listing: `udir.c`

```
#include <ctype.h>
#include <os9.h>
#include <stdio.h>

#define TRUE        1
#define FALSE       0
#define _DIR        128

#define EXTEND      2
#define UNFORMAT    3

typedef struct {
     char      lsn[3];
     unsigned  len;
} FD_SEG;

typedef struct {
     char      attr;
     unsigned  owner;
     char      date[5];
     char      link;
     long      size;
     char      create[3];
     FD_SEG    segment[48];
} FD;

int  SlashDir;
int  DirType;
```

to be accessed as `argv[0]`. For a little more detail, the argument vector is initially set up as in Figure 1. When `argv` is incremented, it points to the next element as shown in Figure 2.

An array of string pointers can also be thought of as a two-dimensional array where `argv` contains the address of the first item in the array. By the same token, `argv[0]` contains the address of the string while both `argv[0][0]` and `*argv[0]` contain the value of the first character in the first item of the array. (Yes, indeed, pointers are a source of a lot of confusion. Perhaps we'll take a closer look at them in a future installment.) Finally if the first character in the current command line argument (`*argv[0]`) is a hyphen, the loop is executed.

The variable s points to the second character in the current command line argument (`argv[0]+1`), and the loop continues until the null character is encountered in the string. After each iteration through the loop,

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s is incremented to point to the next character in the string. Finally the `switch` statement takes control and compares the character converted to lowercase with each of the `case` statements.

At this point our parsing routine has terminated; the argument vector is currently pointing to the third element in the array, which should be our first filename. To finish it off, the function loops through each of the remaining command line arguments, printing a directory listing for each filename.

The `GetDir` function attempts to open the filename passed to it as a file. If this fails, it tries to open it as a directory. If the second `open` call fails, an error message is printed along with the error code. Next the file descriptor sector for the file is read into the `fildes` structure through the use of the `SS.FD` get-status system call. (Many thanks to Kevin Darling for bringing this undocumented system call to my attention.) The entry conditions are the path number in Register A, $0F in Register B, the address of the buffer in Register X, and the number of bytes requested in Register Y. To obtain the entire file descriptor sector, use 256 bytes.

You may want to play around with the code to make a powerful alternate to the `dir` command. Some ideas that spring to mind are to add a wide directory listing, perhaps five columns for an 80-column screen, and use Carl Kreider's pattern-matching and directory functions. You might also list the number of entries in the segment list to get a rough idea of the fragmentation of each file. ☐

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```
FD   fildes;

main(argc, argv)
int  argc;
char *argv[];
{
     char *s;

     pflinit();

     SlashDir = FALSE;
     DirType = EXTEND;

     while(--argc > 0 && (*++argv)[0] == '-') {
          for(s = argv[0] + 1; *s != '\0'; s++) {
               switch(tolower(*s)) {
                    case 'e':
                         DirType = EXTEND;
                         break;
                    case 's':
                         SlashDir = TRUE;
                         break;
                    case 'u':
                         DirType = UNFORMAT;
                         break;
                    default:
                         printf("Invalid option - %c\n", *s);
                         break;
               }
          }
     }

     if(DirType == EXTEND) {
          printf("Owner Created  Last Modified  Link Attributes Sector ");
          printf("Bytecount Name\n");
          printf("----- -------- -------------- ---- ---------- ------ ");
          printf("--------- --------------\n");
     }

     do {
          GetDir(argv[0]);

          if(DirType == EXTEND)
               ExtendDir(argv[0]);
          else
               printf("%s%c\n", argv[0], (SlashDir && (fildes.attr & 0x80))
                    ? '/' : ' ');
    } while((*++argv)[0] != '\0');
}

GetDir(name)
char *name;
{
     int  path;
     struct registers regs;

     if((path = open(name, _READ)) == -1)
          if((path = open(name, _DIR + _READ)) == -1)
               printf("Open error #%d\n", errno);

     regs.rg_a = path;
     regs.rg_b = SS_FD;
     regs.rg_x = &fildes;
     regs.rg_y = 256;
     if((_os9(I_GETSTT, &regs)) == -1)
          printf("SS_FD error #%d\n", errno);
     close(path);
}

ExtendDir(name)
char *name;
{
     long sector;

     l3tol(&sector, fildes.segment[0].lsn, 1);

     printf("%5u %02d/%02d/%02d %02d/%02d/%02d %02d:%02d %4d", fildes.owner,
          fildes.create[1], fildes.create[2], fildes.create[0], fildes.date[1],
          fildes.date[2], fildes.date[0], fildes.date[3], fildes.date[4],
          fildes.link);

     printf("  %c%c%c%c%c%c%c%c  ",
          fildes.attr & 0x80 ? 'd' : '-', fildes.attr & 0x40 ? 's' : '-',
          fildes.attr & 0x20 ? 'e' : '-', fildes.attr & 0x10 ? 'w' : '-',
          fildes.attr & 0x08 ? 'r' : '-', fildes.attr & 0x04 ? 'e' : '-',
          fildes.attr & 0x02 ? 'w' : '-', fildes.attr & 0x01 ? 'r' : '-');

     printf("%6lX %9ld %s%c\n", sector, fildes.size, name, (SlashDir &&
          (fildes.attr & 0x80)) ? '/' : ' ');
}
```

Sugar Software

Sugar Software Gazette

Volume 1 Issue 3 Winter, 1990

The Calligrapher

Turn your CoCo or IBM PC into a calligrapher's quill. Make beautiful invitations, diplomas, certificates, love letters and labels. The Calligrapher can also be used for desktop publishing to print newsletters, flyers and ads. All this is possible with the Calligrapher which is now available for both OS9 or MS-DOS systems.

The Calligrapher is a text formatting program. It reads a text file which contains text and formatting codes and prints the text in graphics mode on a dot-matrix printer in various fonts.

The formatting codes tell the Calligrapher which font to use, when to change fonts, and all about centering, left, right or full justification, line fill, margin, line width, page size, page break and indentation. The Calligrapher Version 2 has support for multiple columns (like this ad), macros, page numbers, temporary indents, headers and footers, interactive prompting and more!

Calligrapher Fonts

The Calligrapher comes with three half-inch fonts (quarter-inch shown here):

Old English
Gay Nineties
Cartoon

The Calligrapher uses many different fonts (type styles) in both half-inch and smaller sizes. For example, this ad was formatted and printed with the Calligrapher using the Courrier fonts. About 150 other fonts are available on 15 disks sets or 5 economy packages.

The CoCo Calligrapher

The CoCo Calligrapher prints the same fonts as the OS9/MS-DOS Calligrapher. Though not as powerful, the CoCo Calligrapher is an easy to use, menu driven program for those CoCo owners that don't use OS9. It can print lines left justified or centered and can print in condensed mode on some printers.

Calligrapher Graphics

The popular Calligrapher programs now have graphics pictures, called CliPix that may be printed. These are specified in your text files similar to fonts. These CliPix pictures come about 60 to a disk. Each CliPix comes in a few different sizes and orientations. CliPix examples are on this ad. CliPix pictures may easily be integrated with text using the OS9/MS-DOS Calligrapher, but they may also be printed using the CoCo Calligrapher.

Version 2

A new version of the Calligrapher is now available for OS9. Version 2 of the Calligrapher adds over 15 new directives over the Version 1.x. There is support for multiple columns by just specifying the width and length of the columns and the space between them. Also added are macros, temporary indents (useful around CliPix pictures), page numbers, headers and footers, and more. Upgrade old OS9 versions for $12.50.

MS-DOS Calligrapher

Calligrapher (Version 2) now lets owners of the IBM PC (and compatibles) have the same capabilities that the OS9ers have had for years. The MS-DOS font files are compatible with OS9, so if you have the OS9 Calligrapher and font files, you can buy the new MS-DOS Calligrapher and then simply copy your old OS9 font files to your PC! No other conversions are necessary. If you have CoCo Calligrapher font files, you will need to convert them to MS-DOS/OS9 format using the Calligrapher Massager program.

Calligrapher Massager

The Calligrapher Font Massager is a "tool" that allows you to do many things to Calligrapher font files. You may create new fonts, modify existing fonts, invert fonts, compress fonts, double the height and/or width, halve the height and/or width and convert between CoCo RS-DOS and OS9/MS-DOS formats. The Massager was used to create many of the Calligrapher fonts and CliPix pictures.

Prices

Specify the format desired: CoCo RS-DOS, OS9 or MS-DOS. The Font Massager is not available in CoCo RS-DOS format.

Callig. with the 3 fonts shown: $24.95
Calligrapher with ANY 2 Font Pkgs: $59.95
Callig, Massager, ALL 5 Font Pkgs: $124.95
Calligrapher Font Massager: $19.95
CliPix Disks (#1-8): $9.95 (4 for $29.95)
Individual Font Sets (#1-15): $14.95
  Set #1: Reduced and reversed originals;
  Set #2: Old Style and Broadway;
  Set #3: Antique and Business;
  Set #4: Wild West and Checkers;
  Set #5: Stars, Hebrew and Victorian;
  Set #6: Block and Computer;
  Set #7: Small: Roman, Italics, Cubes, etc;
  Set #8: Novelty fonts;
  Set #9: Gallant and Spartan;
  Set #10: Several Roman fonts;
  Set #11: Gothic and Script;
  Set #12: More Roman and Italic;
  Set #13: Several Courier fonts;
  Set #14: Modern and Screen;
  Set #15: Tektron and Prestige.

Economy Font Packages (#1-5): $29.95 or save big by buying two or more at $19.95 each:
  Pkg #1: - Above Font Sets 1, 2 and 3;
  Pkg #2: - Above Font Sets 4, 5 and 6;
  Pkg #3: - Above Font Sets 7, 8 and 9;
  Pkg #4: - Above Font Sets 10, 11 and 12;
  Pkg #5: - Above Font Sets 13, 14 and 15.

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The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

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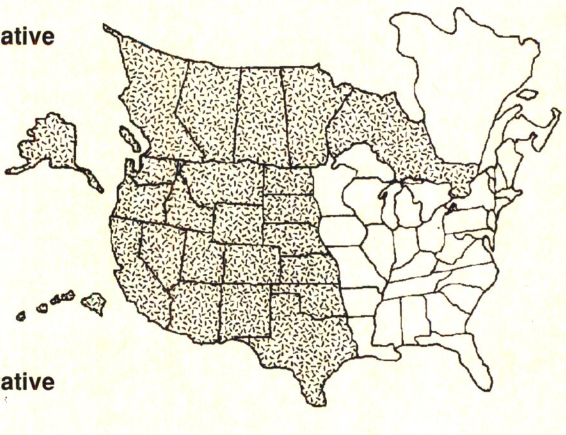

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UltiMusE III is a MIDI 'Notation Sequencer'. It lets you write and edit sheet music on a 640x192 graphics screen using the mouse, play it on ANY MIDI-equipped synthesizer(s), and print out the score... Written by an experienced computer professional who is also a serious amateur musician and composer. With **UltiMusE III**, there is no more 'faking' to play what you want to hear! Perfect for the trained musician, **UltiMusE III**'s natural notation also helps a beginner to copy a favorite piece of sheet music just as it looks. Why should your music sound like a machine? **UltiMusE III** has a wide pitch range, from 4 octaves below Middle C to over 3 above. Each staff has a 4-octave range centered on one of four clefs - Treble, Guitar, Bass, and Double Bass. Staff placement, clefs, and part and MIDI channel assignments can ALL be edited... Professional software should use a professional Operating System. **UltiMusE III** uses the advanced features of OS-9 Level II and does not interfere with its windowing and [illegible]king in any way.

SYSTEM REQUIREMENTS: CoCo 3 with at least 256K memory, OS-9 Level 2, Mouse or Joystick (Hi-Res Joystick Adapter recommended), Synthesizer(s) with MIDI-In jack, plus a Serial to MIDI cable. Tandy's DMP printer, a MIDI Interface Pak, and a Multi-Pak are optional equipment.

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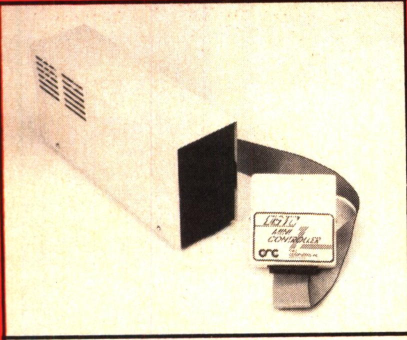
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- Includes RS 1.1 Modified to access Double-sided Drive

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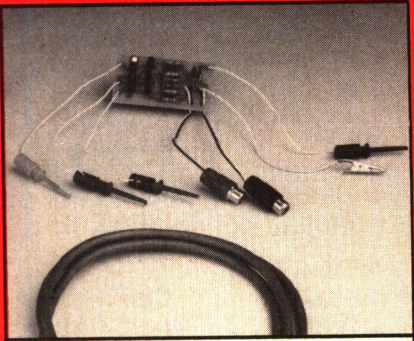

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- 80 Column
- Built in Speaker

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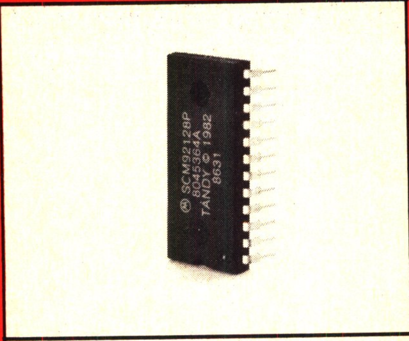
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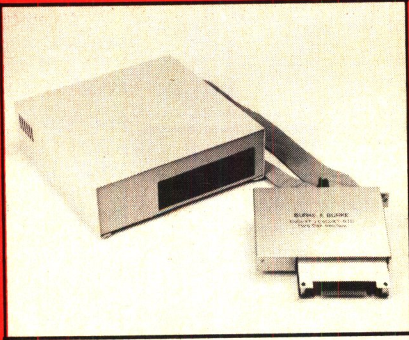
RS 1.1 DOS
- ROM Chip for Disk Controller
- Works for CoCo 2 or 3

$25 (2 ship)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See Rainbow Reviews 8/89

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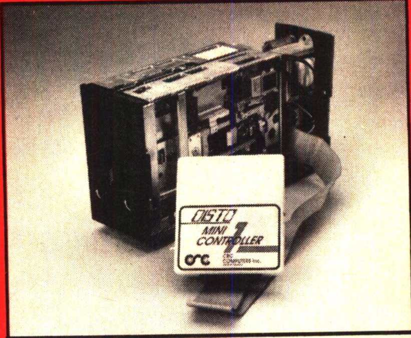
*Burke & Burke **CDC drive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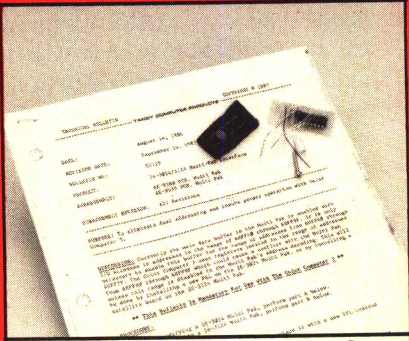
- Disto controller & cable

$310 (8 ship)



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Makes multi-pack interface work with CoCo 3. Specify 26-3024 or 26-3124. $14.95 (2 ship)

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Needs SP-C **$189** (5 ship)

SLOT-PACK II
MP - II

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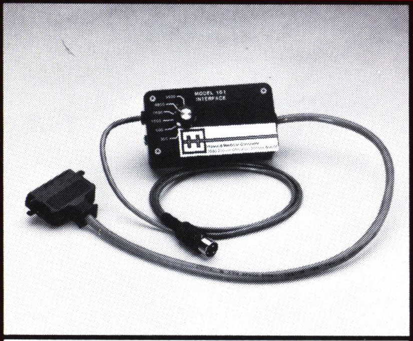
MP - II	**$89.45**
AC Adapter AC - 9	**$14.95**

TEAC 55B

- 360K Double Sided Half Ht. Floppy
- Fits R.S. 501 & 502

CA-2 cable $29.50 **$98** (2 ship)



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- Serial to Parallel Converter
- Connect CoCo to Parallel Printer

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with clock	99.45
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Combines joystick port, Radio Shack high resolution adapter, CoCo Max high resolution adapter into one unit with switches.

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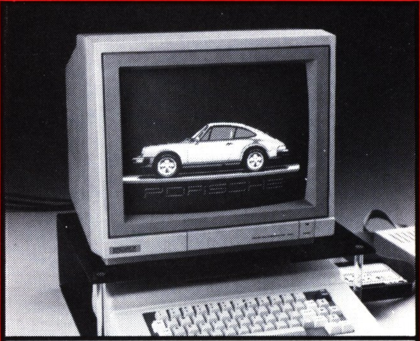

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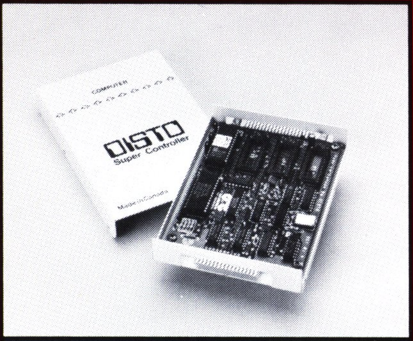
- 80 Column
- Use with Coco, Tandy 1000's, IBM PC

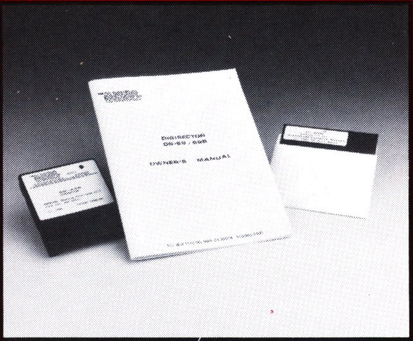
CC-3 RGB cable 19.95 **$279** (14 ship)



DISTO DC-3

- Original Disto Controller
- 2 ROM Slots; Gold Platted Contacts

$98 (2 ship)



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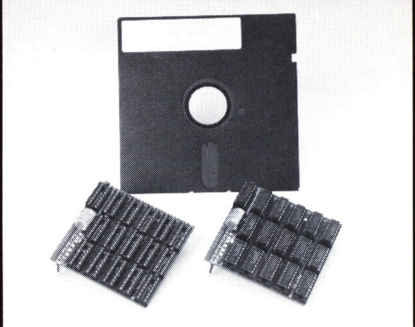

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64K 8 Chip for CoCo 2	**$30**

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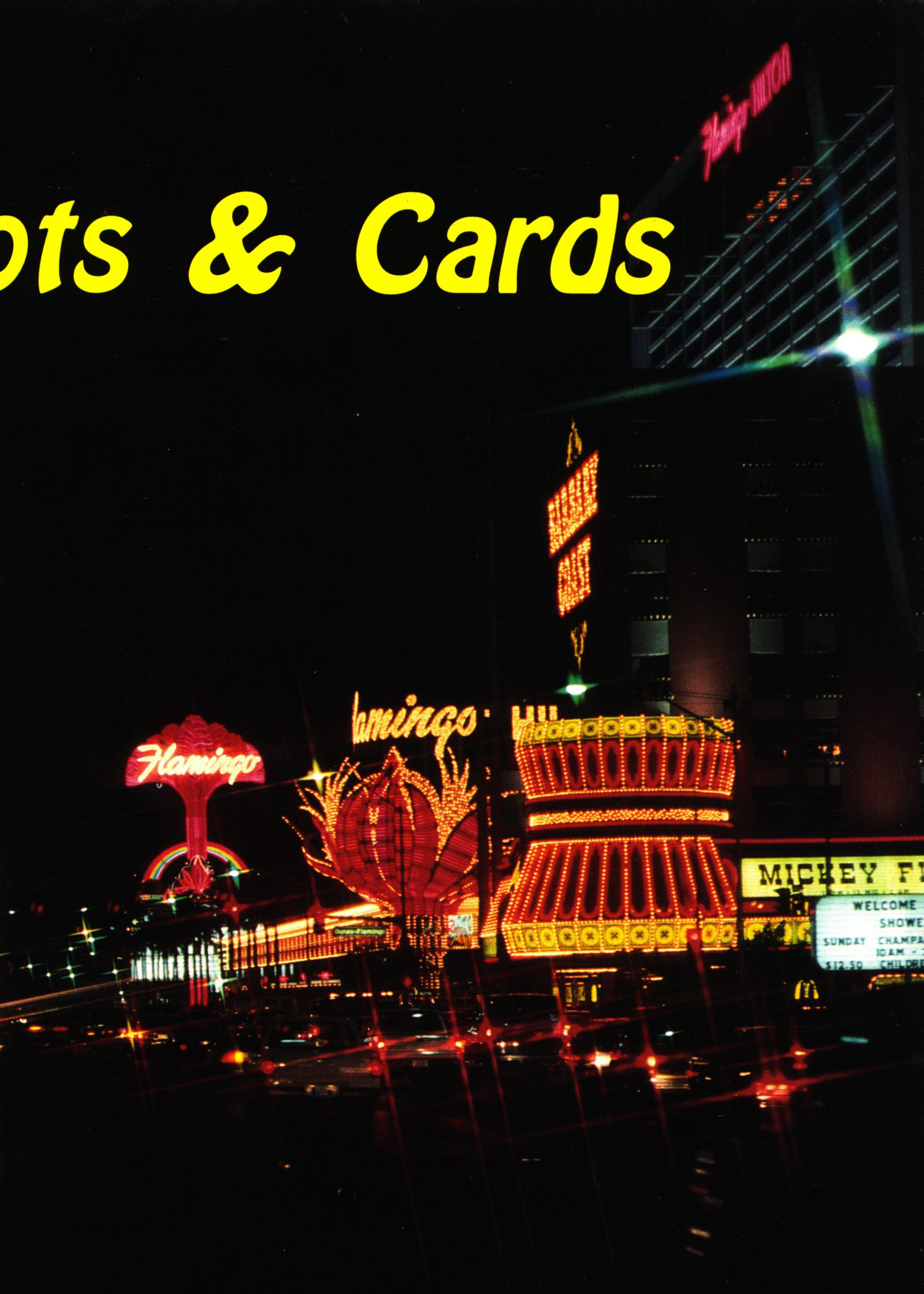
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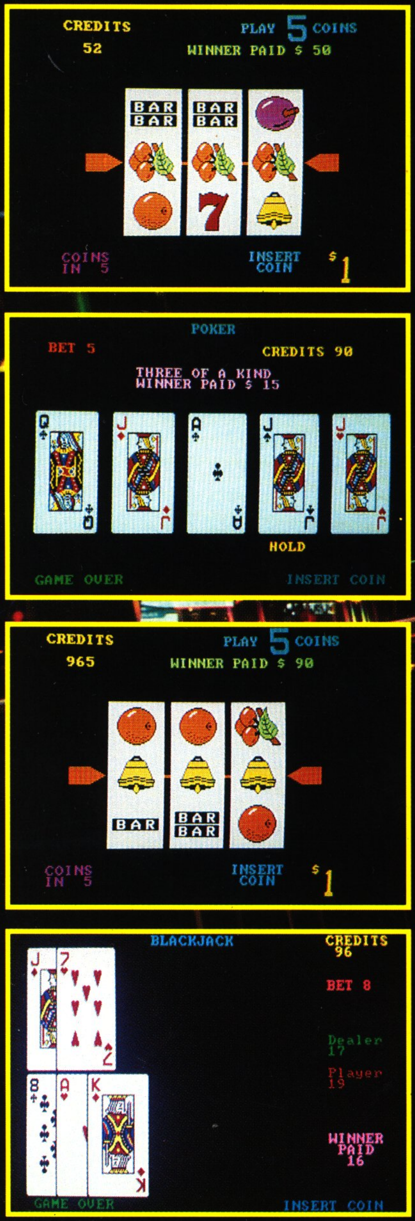
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